OPERATION
AND
SERVICE MANUAL

MODEL 1205A/1235A SWEEP SIGNAL GENERATOR

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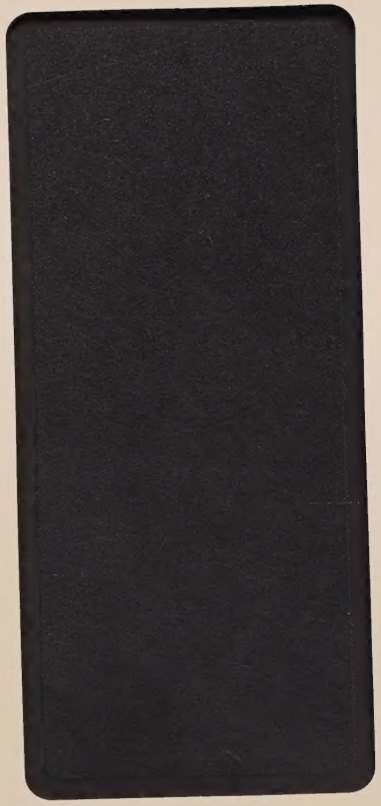

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NO. 490270

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MODEL 1205A/1235A

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SECTION I INTRODUCTION

1.1 GENERAL INFORMATION

The Model 1205A/1235A is a Sweep/Signal Generator covering the frequency range of 1 to 1500 MHz in three bands. The instrument provides all necessary versatility for laboratory use while maintaining small size and rugged construction required for production use.

For accurate determination of frequencies, this instrument is capable of being equipped with harmonic (Model 8020) and single frequency (Model 8015) markers. These are birdy-bypass markers. The individual marker frequencies are determined by the particular application of the instrument. The instrument will accept a maximum of seven birdy marker plug-in cards.

1.2 SPECIFICATIONS

Table 1-1 lists the principal functional, electrical, and mechanical specifications of the Model 1205A/1235A Sweep Generator.

Table 1-1 Model 1205A/1235A Specifications

Specification	Characteristics
Frequency Range	Overall 1 to 1500 MHz Band 1 1 to 500 MHz Band 2 450 to 950 MHz Band 3 900 to 1500 MHz
Sweep Width	200 KHz to 500 MHz
Output Level	0.5 Vrms
Output Impedance Model 1205A Model 1235A	 50 ohms 75 ohms
Leveling Range	3dB
Flatness	±0.5dB (1235A: ±1.0dB on Band 3)
Attenuators Model 1205A Model 1235A	 110dB in 1dB steps 80dB in 1dB steps
Signal Purity	Harmonics -30dB Spurious -30dB
Linearity	1%
Dial Accuracy	±10 MHz

Table 1-1 (cont'd)

Specification	Characteristics
Residual FM	20 KHz max.
Drift (after 30 minute warmup)	Short Term (5 minute), 200 KHz max. Long Term (8 hour), 2 MHz max.
Sweep Rate	
Line	Line Frequency.
Variable	0.01 to 50 Hz in two overlapping ranges.
Manual	Frequency and horizontal proportional to MANUAL control setting.
External	External 25V P-P for maximum sweep width up to 100 Hz. CW output equal to center frequency when external sweep is zero.
Horizontal Voltage	10V P-P into 47K ohms.
Blanking	Oscillator off during retrace, 0V reference during blanking. Switchable on/off.
External AM Modulation	30% modulation with 10 volt peak-to-peak input signal up 1 KHz.
ALC Source	Either internal or external, as selected by rear panel switch. Negative input required.
Birdy Markers	
Type	Harmonic, (Model 8020) - see 8020 specifications. Single frequency (Model 8015) - see 8015 specs.
Number	Seven
Source	Sweep sample from RF output.
External	0.5V marker for -6dBm input.
Width	Wide, 100 KHz peak-to-peak nominal. Narrow, 20 KHz peak-to-peak max.
Power	115V AC or 230V AC, 50/60 Hz, 30 watts
Dimensions	8 5/8"W X 6 3/4"H X 11 1/4"L 21.9 cm W X 17.2 cm H X 28.6 cm L
Weight	Less than 20 lbs. (9 Kg)
Operating Environment	
Temperature	0° to 50°C
Relative Humidity	0 to 80%

1.3 OPTIONS/ACCESSORIES

The following options and accessories are available to aid in the application and maintenance of the Model 1205A/1235A:

RF Detector, Model 8551 and 8571 Detects RF envelope.

Cable Sets, Models CS-1, CS-2 and CS-6 Set of cables and extender cards for interconnecting the sweep generator in a typical operating or maintenance setup.

External Monitor, Model 3520 Provides an external ALC voltage to the instrument to improve flatness at a remote location.

Display Oscilloscopes, Model 121 and 122 Provides a large screen display of the detected response. The Model 121 is a single trace display and the 122 is a dual trace display.

SECTION II INSPECTION AND INSTALLATION

2.1 INITIAL INSPECTION

Upon receipt, visually inspect the carton for any external damage. If damage is evident, notify the carrier, or his agent, before opening the carton. Inspect the instrument for damages such as broken controls or connectors, and dents or scratches on the surfaces of the unit. If damage to the instrument is evident, refer to Appendix A.

2.2 PREPARATION FOR USE

The Model 1205A/1235A may be operated from an AC source of either 115 or 230 volts. The instrument must be checked prior to initial operation to verify the internal power selector switch is in the correct position. To do this, remove the four screws that hold the cover to the chassis and lift off the cover. The 115V/230V slide switch on the rear panel printed circuit board can then be set to the position corresponding to the AC line voltage. Replace the cover and the four screws.

The performance of the instrument should be checked as part of the receiving inspection. Section V gives complete test and calibration instructions which, when completed, should place this instrument within specified operating limits.

SECTION III OPERATION

3.1 INTRODUCTION

This section describes the function of the controls and connectors, and outlines general procedures for use of the instrument. Refer to SECTION V for description of internal controls.

3.2 FRONT PANEL DESCRIPTION

Figure 3-1 identifies and briefly describes the front panel controls and connectors of the Model 1205A/1235A. More extensive description of some controls are given in the following paragraphs.

SWEEP MODE Switch Select between three internal sweep rates, manual sweep, and external sweep. The positions are as follows: 01-1 position provides a variable sweep at rates between 0.01 and 1 Hz; 0.5-50 Hz position provides a variable sweep at rates between 0.5 and 50 Hz; LINE position synchronizes the sweep to the frequency of the AC power line; MANUAL position enables the operator to manually sweep the oscillator with the VERN/MAN control, and EXT/CW position allows an external signal to sweep the oscillator.

VERN/MAN Control Provides continuous control of the sweep rate when the SWEEP MODE switch is in either 01-1 or 1-50 position. In the MANUAL position this control sweeps the oscillator through the range set by the CENTER FREQUENCY and SWEEP WIDTH controls.

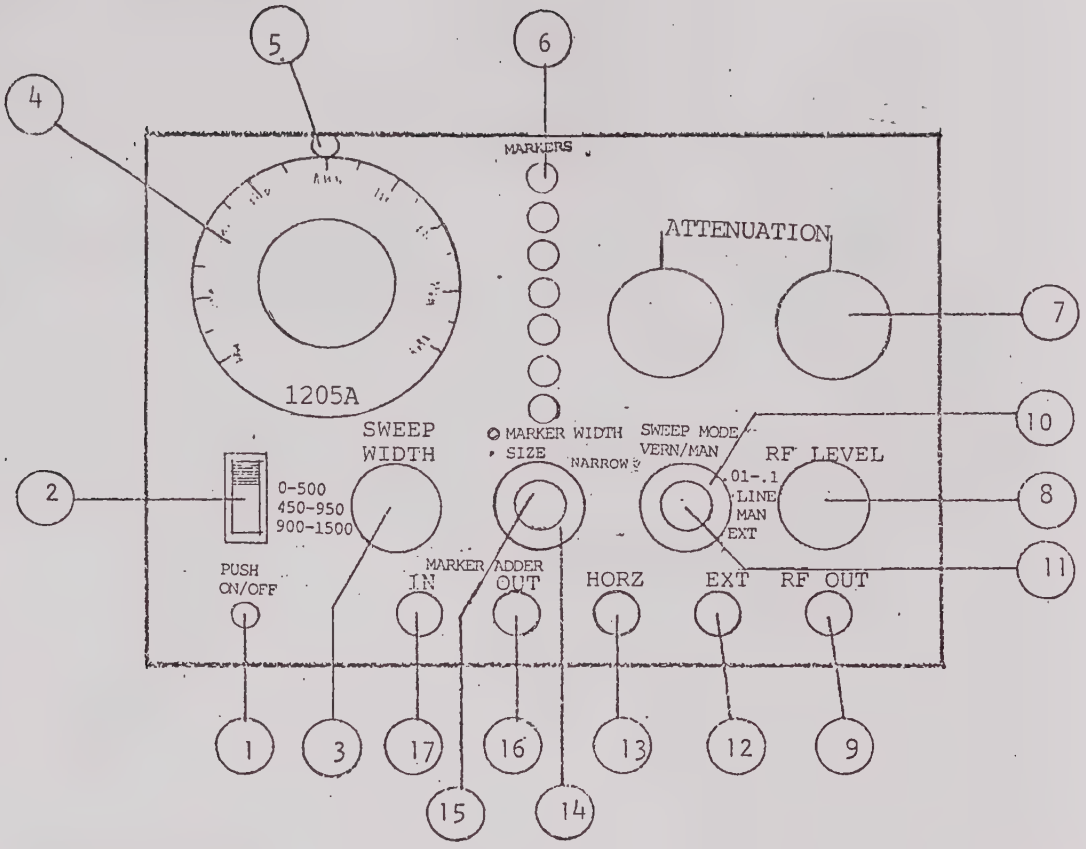
HORIZ Output Connector The voltage at this connector is a function of the RF output frequency which drives the horizontal input of an oscilloscope. With SWEEP MODE switch in the internal sweep positions, this voltage is a ±10V sawtooth. In MANUAL mode, it is a DC voltage proportional to the VERN/MAN setting; and in the EXT mode, it is directly proportional to the input signal at the EXT connector.

3.3 REAR PANEL DESCRIPTION

Figure 3-2 identifies and briefly describes the rear panel controls and connectors of the Model 1205A/1235A.

3.4 TYPICAL OPERATION

Figure 3-3 shows the most common operational setup for the Sweep Generator.



1. POWER Switch. Provides on/off control for AC power.

2. BAND switch. Select center frequency band.

3. SWEEP WIDTH. Provide continuous variation in sweep width from 200 KHz to 500 MHz.

4. CENTER FREQUENCY DIAL. Determines the center frequency of the swept RF output.

5. POWER Indicator and Dial Pointer. Illuminates when instrument is turned on. The LED should never need replacement.

6. MARKERS ON/OFF. Provides on/off control of individual markers.

7. ATTENUATORS. Attenuates the RF output in 1 and 10dB steps.

8. RF LEVEL. Provides 3dB of RF output level variation.

9. RF OUT. Type BNC connector - provides swept RF output.

10. SWEEP MODE. Select various sweep rates and modes. (See para. 3.2)

11. VERN/MAN. Varies the sweep rate or frequency. (See para. 3.2)

12. EXT input. Type BNC connector - provides an input for external sweep. Input impedance - 10KΩ.

13. HORIZ output. Type BNC connector - provide a sweep voltage to the horizontal input of an oscilloscope. (See para. 3.2)

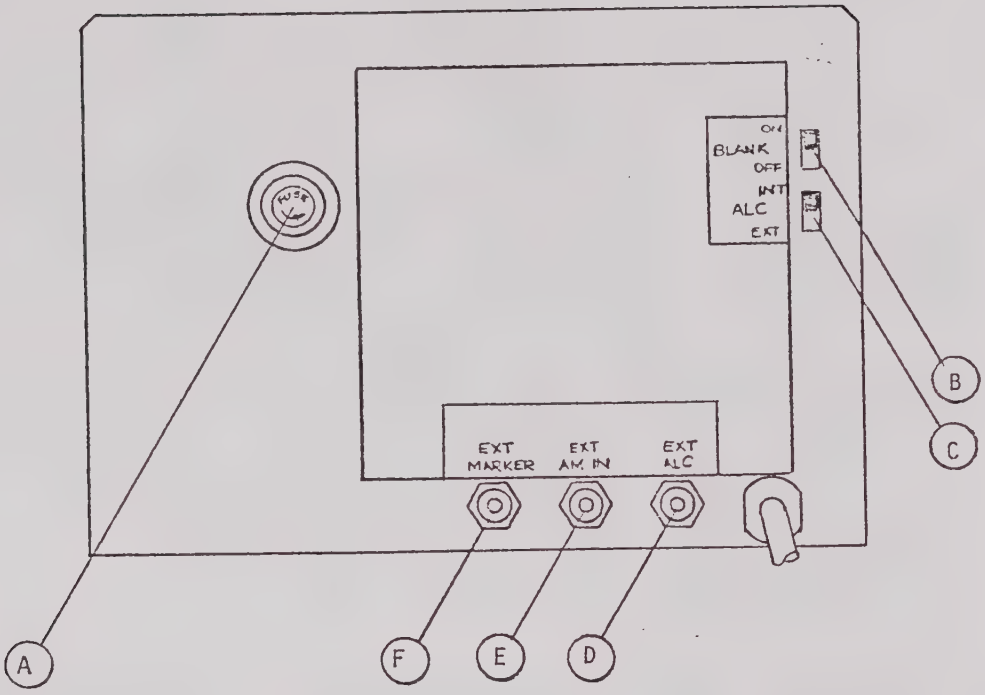
14. MARKER WIDTH. Select between two birdy marker widths.

15. (Marker) SIZE. Varies the amplitude of the birdy markers.

16. MARKER ADDER OUT. Type BNC connector - provides detected response with markers superimposed to the vertical input of an oscilloscope.

17. MARKER ADDER IN. Type BNC connector - provides an input for the detected response for superimposing the markers.

Figure 3-1 Model 1205A/1235A Controls & Connectors (Front Panel)



A. FUSEHOLDER. Contains power line fuse (1A).

B. BLANKING ON/OFF. Switch retrace blanking on or off.

C. ALC INT/EXT. Selects between the internal monitor or an external monitor.

D. EXT ALC INPUT. Type BNC connector provides input for external monitor.

E. AM INPUT. Type BNC connector provides input for AM modulation of RF output.

F. EXT MARKER INPUT. Type BNC connector provides an input at 50Ω for an external RF source which is used to generate a birdy marker at the source frequency.

Figure 3-2 Model 1205A/1235A Controls & Connectors (Rear Panel)

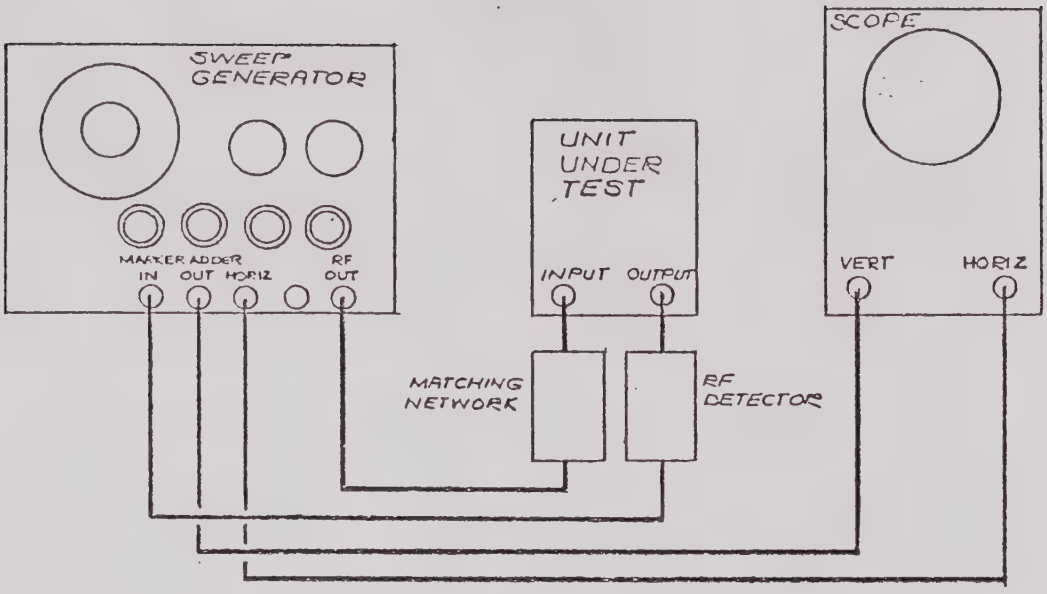


Figure 3-3 Typical Sweep Generator Operating Setup

Make the connections to the oscilloscope (or X-Y plotter), the device under test, and the RF detector as shown. All connectors on the sweep generator are type BNC and it is recommended that coaxial cable be used for all connections. This insures good ground connections; and minimize hum, leakage, and pick-up of spurious external signals. The RF output cable impedance should match the output impedance of the sweep generator. If the input impedance of the device under test is not the same as the sweep generator, a matching network should be used as shown in Figure 3-3.

The input impedance of the RF detector must present the proper load to the device under test. For 50 and 75Ω applications, Telonic 8000 series detectors are recommended.

Depress the POWER push-button. The LED indicator should be illuminated indicating operation of the instrument.

After completing the setup, adjust the controls for the required center frequency, sweep width, output amplitude, and sweep rate. Turn the desired markers on and adjust their size and width.

If operation is not normal, refer to Section V of this manual.

3.5 SPECIAL OPERATING NOTES

Errors From Fast Sweep Rates:

When sweeping devices with steep response curves, errors may occur in the detected response. These errors are caused mainly by the time constant of the RF detector. Figure 3-4 illustrates these errors with respect to sweep rate.

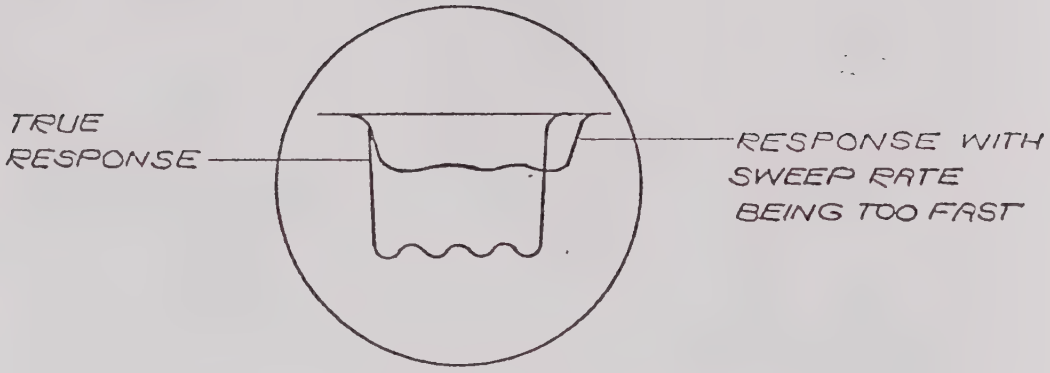


Figure 3-4 Sweep Rate Effects

To correctly set sweep rate, first set the controls for the maximum desired sweep rate, then slowly reduce the sweep rate while observing the detected response. Any change indicates the sweep rate is too fast for a true response. When the detected response no longer changes with sweep rate, a true response has been obtained.

CW Operation:

This instrument may be operated in the CW mode by placing the SWEEP MODE switch to either MAN or EXT.

External ALC:

Unflatness in the detected signal can be caused by the cabling between the RF output and the unit-under-test, or an impedance mismatch between the cabling and the unit-under-test. In these causes, flatness can be improved substantially by inserting an external monitor at the input of the unit-under-test. The instrument requires a negative peak detecting monitor such as Telonic Model 8033.

To use an external monitor, connect the detected output of the monitor to the EXT ALC input and place the ALC INT/EXT on the rear panel switch to EXT.

It is important to realize the instrument's step attenuators are ineffective in this mode of operation. The leveling loop will attempt to cancel out any attenuation inserted. The RF LEVEL control will vary the RF output level as it controls the leveling loop, rather than inserting attenuation. It can also be used to compensate for any differences in the output level between internal and external leveling. Because of the leveling loop, the effective output impedance of the external monitor is zero ohms. 50 or 75 ohm impedance may be obtained by inserting an attenuator at the output of the monitor. 7dB of attenuation will provide a 1.5 to 1 source VSWR; more attenuation will improve this VSWR.

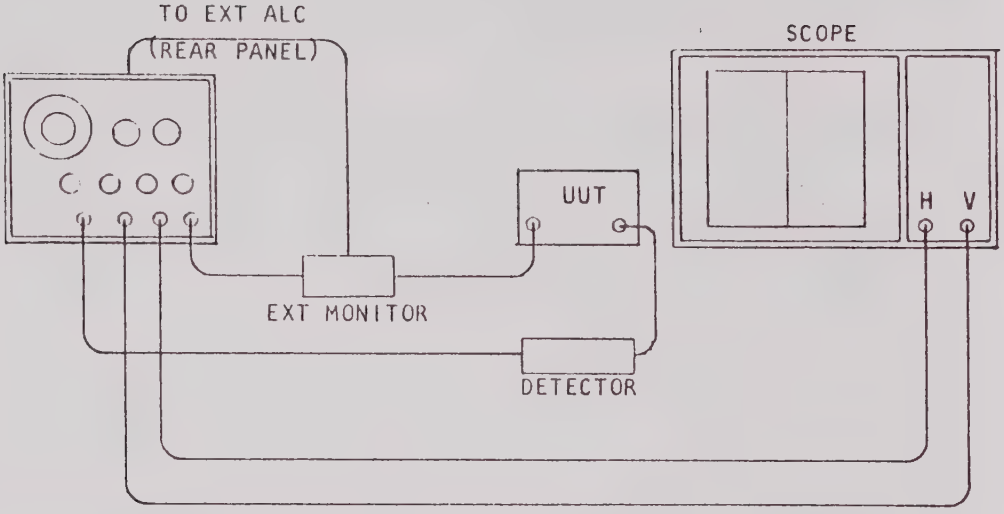


Figure 3-5 External ALC Connections

SECTION IV THEORY OF OPERATION

4.1 INTRODUCTION

This section describes the theory of operation in terms of an overall functional block diagram, and then in terms of more detailed block diagrams. Figure 4-1 contains both block and module information for the entire instruments. Schematic diagrams are contained in Section VII.

4.2 GENERAL DESCRIPTION

The Model 1205A/1235A is a three band sweep generator, whose output is derived from two voltage controlled oscillators (VCO). The upper band is the output of the 900-1500 MHz VCO. The middle band is the output of the 450-1000 MHz VCO. The lower band is the heterodyned combination of 450-1000 MHz VCO and the 900-1500 MHz VCO, which is amplified in the 1-500 MHz amplifier. The output signal is coupled through the monitor and attenuators to the RF output.

The switching of the oscillators is done through the RF Distribution/ Mixer/Combiner (RDMC). The control of the RDMC is provided by the front panel band switch. All switching is solid state - no relays or other electromechanical devices are used.

The sweep drives for the VCOs are pseudo logarithmic ramps shaped by the linearity circuits from the linear horizontal output ramp.

The monitor assembly serves two functions. It provides a detected signal, proportional to the RF output, to the leveling circuitry in order that a constant output amplitude is maintained over the frequency range. Secondly, it samples the output for the generation of frequency markers.

The birdy marker box consists of up to seven optional crystal oscillators and mixers through which "birdy" markers are derived.

4.3 CIRCUIT DESCRIPTION

Power Supply (refer to Figure 4-2 and Schematic Diagram 54-0273-01)

AC Power and Rectifier Circuits. A dual-primary transformer allows operation at line voltages of 115 or 230 volts. Unregulated plus and minus voltages are supplied from a single bridge rectifier (CR1-CR4), then filtered by capacitors C1 and C2 (positive voltage), and C8 and C9 (negative voltage).

+24 VDC Regulator. Regulation is provided by a standard integrated regulator (E1) and a pass transistor (Q2). This integrated circuit has an internal reference source which is compared to the +24V sense input voltage. The output resulting from this difference regulates the voltage at the emitter of Q2. The adjustment of the regulated voltage is provided by R4. Transistor Q1 and associated components limits the supply voltage to E1 at value within the maximum rating of E1.

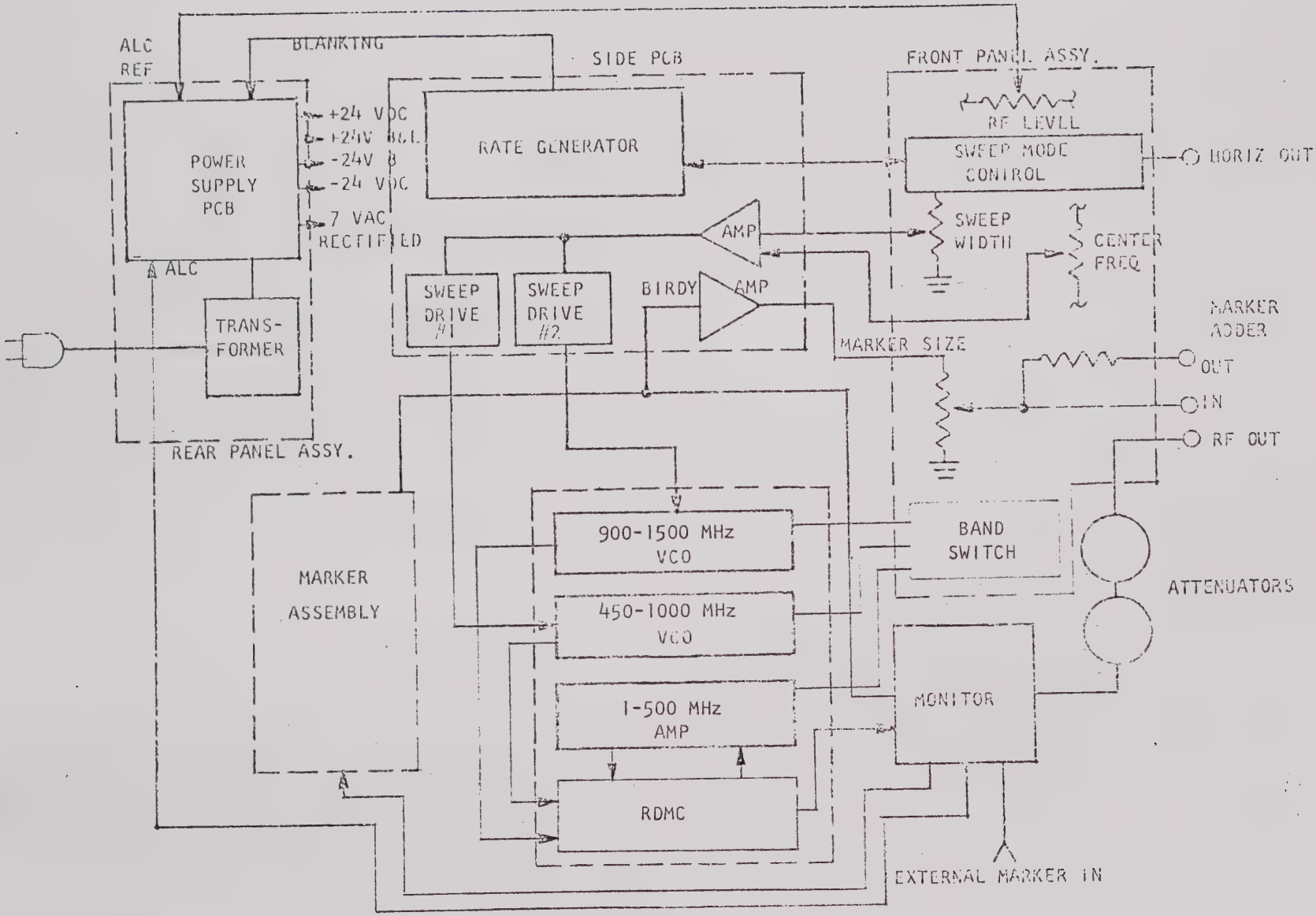


Figure 4-1 Block Diagram, Model 1205A/1235A

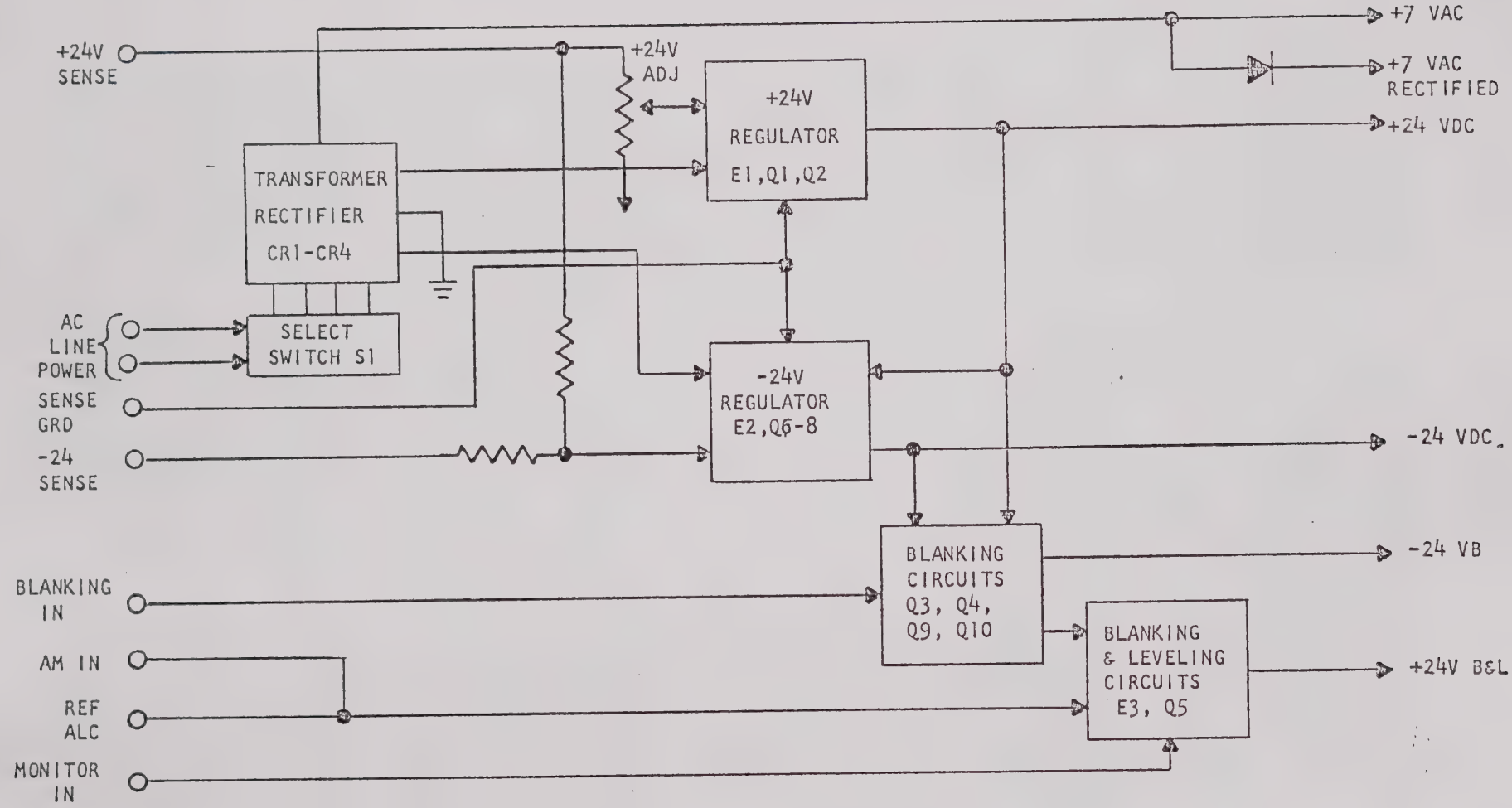


Figure 4-2 Power Supply, Block Diagram

-24 VDC Regulator. This supply consists of an operational amplifier (E2) and a modified Darlington amplifier (Q7 and Q9). The reference for this regulator is ground, and the sense voltage is the sum of +24 VDC and -24V sense taken through R19 and R20. Since the output of E2 will track the +24 VDC regulator, the adjustment of the -24 VDC regulator is also provided by R4. The purpose of CR7 and Q6 is to provide transient and over-voltage protection for E2.

Blanking Circuit. During the sweep retrace period, Q3 and Q4 turn off the +24V BLANKED line, which in turn switches the -24V BLANKED line off through Q9 and Q10.

Blanking and Leveling Circuit. Operational amplifier E3 compares the ALC output of the Monitor module and the DC output of the front panel RF LEVEL control. The output of E3 drives transistor Q5 which provides the necessary current capability required. The supply for E3 and Q5 is the +24V BLANKED line. Consequently, the +24V B&L voltage is zero during retrace. This circuit also provides AM modulation by superimposing the modulating signal on the DC output of the RF LEVEL control

Rate Generator and Sweep Mode Switch (refer to Figure 4-3 and Schematic Diagrams 54-0269-01 and 54-0510-03).

The rate generator circuitry generates a variable rate triangular waveform which has two functions. These are as follows:

a. To provide a horizontal drive signal to an oscilloscope, and

b. To provide a source for non-linear voltage ramps to the varactor diodes in the VCOs.

The rate generator is an operational amplifier (E3) configured as an integrator, followed by a bi-stable limit switch. The integrator generates the triangular waveform from positive and negative voltage levels which are applied to the input of the integrator by the limit switch. The sequence of operation can be assumed to start when the output ramp exceeds a positive threshold. At this threshold, the limit switch output changes from a negative voltage to a positive voltage. The positive input causes the integrator to generate a negative ramp. As the ramp exceeds a negative threshold, the limit switch output returns to a negative voltage; and the sequence repeats itself.

The limit switch consists of five transistors (Q1,Q6-9) and associated resistors. The threshold levels are adjusted by the RAMP ADJ potentiometer. The output of limit switch also provides the square-wave to the blanking circuits in the power supply.

The output of the limit switch is connected through the VERN/MAN control (R12), and one of the range determining resistors (R9 and R10) to the integrator input. Since the slope of the integrator output is proportional to the input voltage, the VERN/MAN control provides variable sweep rate control. The range determining resistors, as selected by the SWEEP MODE switch in the 01-1 Hz and 1-50 Hz positions, sets the RC time constant of the integrator.

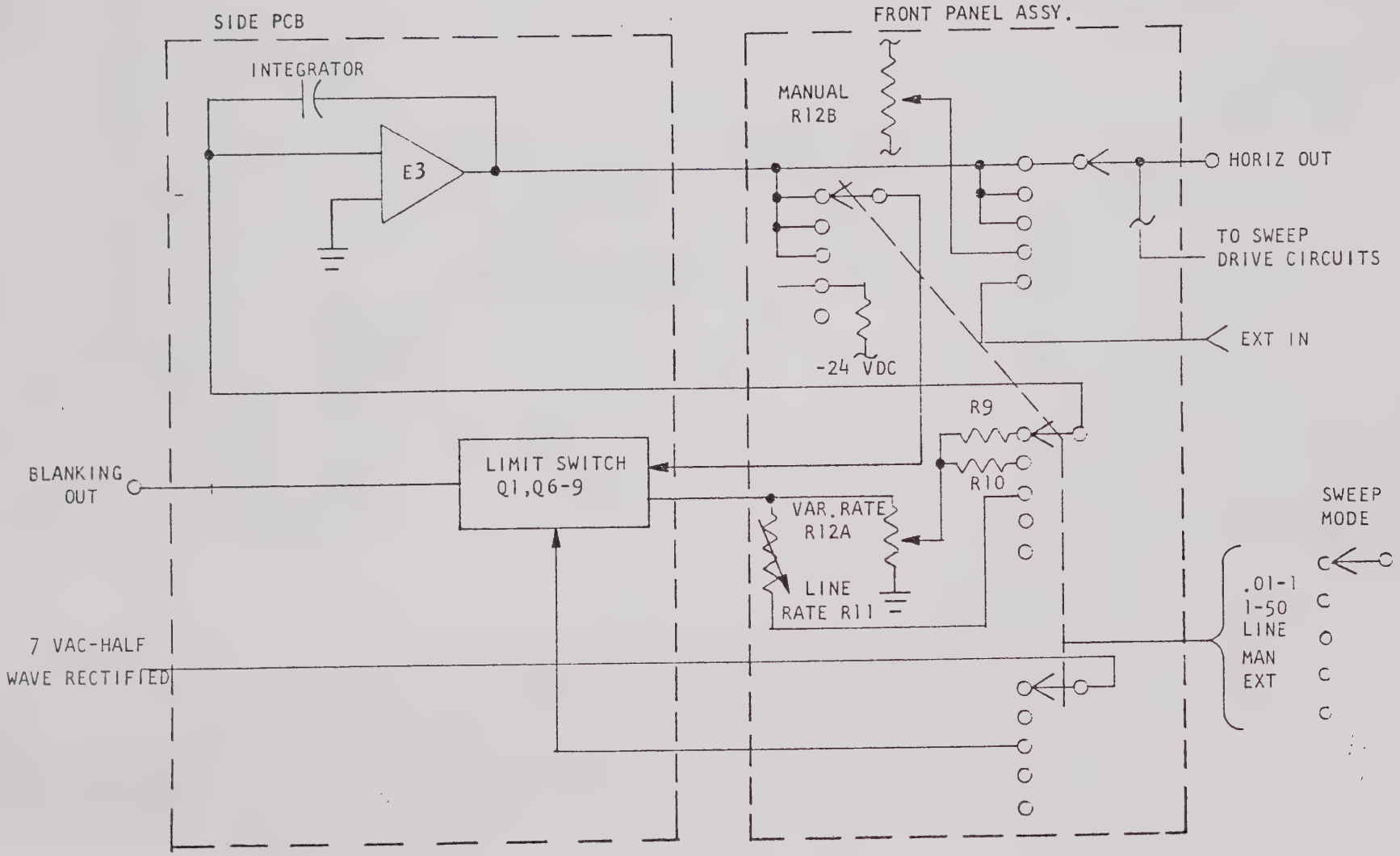


Figure 4-3 Block Diagram, Rate Generator

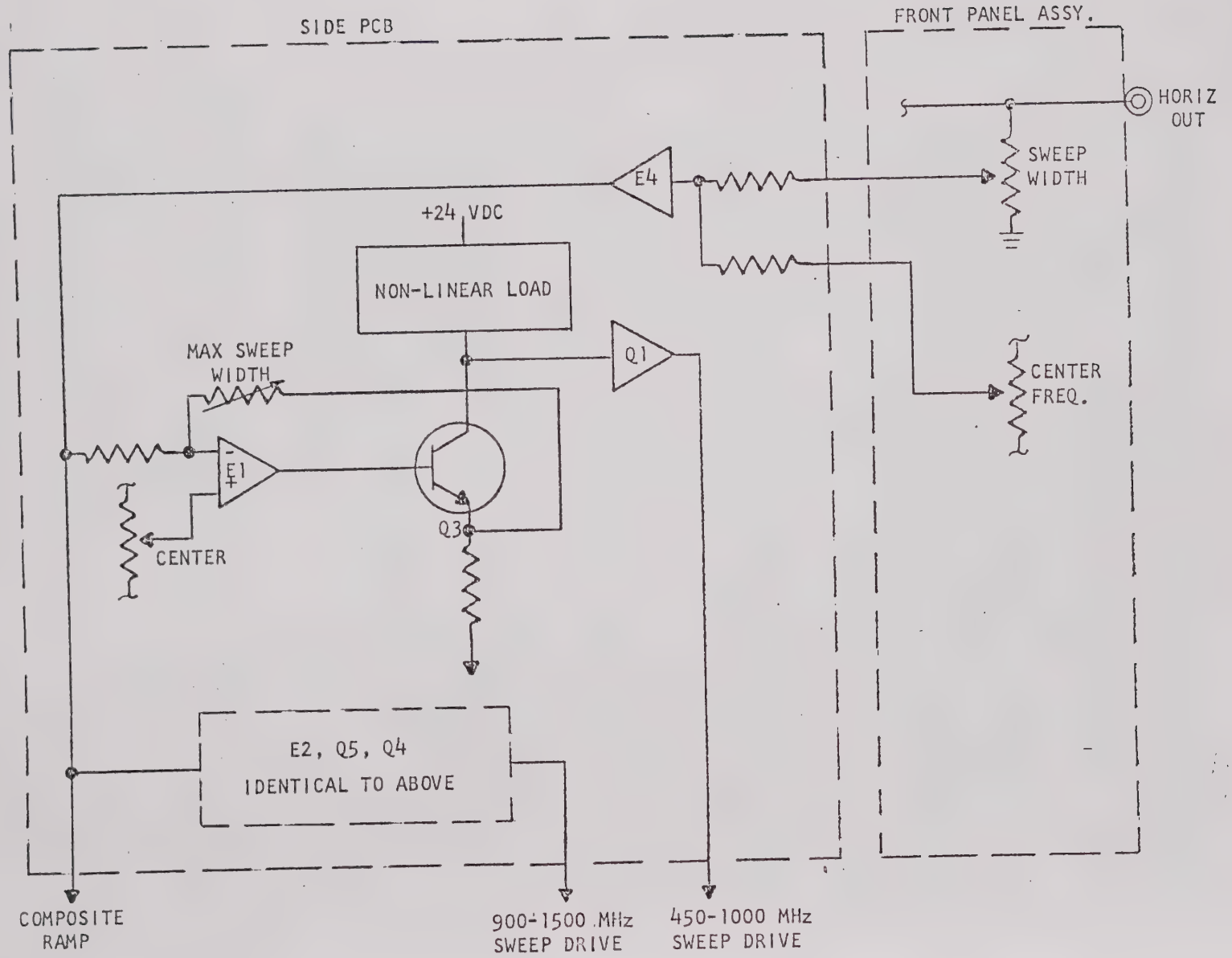


Figure 4-4 Block Diagram, Sweep Drive Circuitry

The LINE position of the SWEEP MODE switch synchronizes the rate generator to the line frequency by connecting a half-wave rectified 7 VAC signal to the limit switch. The limit switch is triggered by this signal to its negative level; thereby synchronizing the start of the positive ramp to an instantaneous line voltage. The LINE ADJ potentiometer adjusts the ramp slope to maintain same negative amplitude.

In the MANUAL and EXTERNAL modes, the loop is broken by the SWEEP MODE switch. The limit switch is switched to its negative output level; thereby turning both blanking voltages on. In the manual mode, the horizontal output and linearity circuits are driven by the output of the VERN/MAN potentiometer (R12). In the external mode, the signal connected to the EXT input provides the same function.

Sweep Drive Circuits (refer to Figure 4-4 and Schematic Diagram 54-0269-01).

The voltage ramps required by the varactors in the oscillators are non-linear. The purpose of the linearity circuits is to modify the linear output of the rate generator and the CENTER FREQUENCY control into the correctly shaped ramps which gives a linear presentation of frequency.

The SWEEP WIDTH control varies the level of the horizontal ramp. This signal and the DC output of the CENTER FREQUENCY control are summed together in E4. The output of E4, the composite ramp, is the input for the two linearity driver amplifiers.

The two linearity driver amplifiers are essentially identical; therefore, only the linearity driver for the 450-1000 MHz VCO will be discussed. E1 and Q3 amplifies and level shifts the composite ramp. The load for this amplifier is a resistor/diode network. The required degree of non-linearity of this load is determined by factory selected resistor values. The voltage developed across the network is coupled through an emitter-follower (Q1) to the VCOs.

900-1500 MHz Oscillator (refer to Figure 4-5 and Schematic Diagram 54-0281-01)

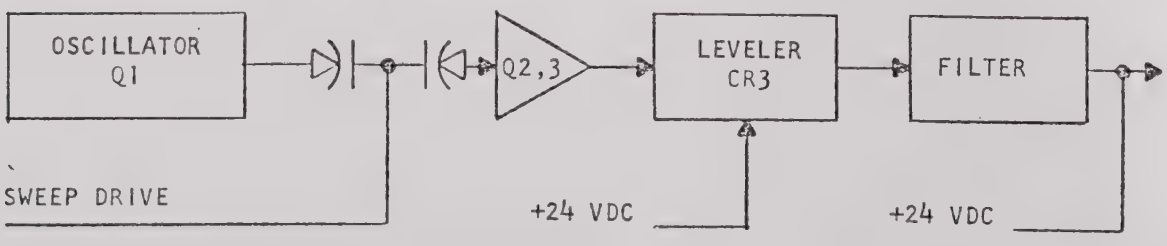


Figure 4-5 Block Diagram, 900-1500 MHz Oscillator

The oscillator is a grounded collector, series tuned circuit consisting of Q1 and associated circuitry. The oscillator operates between 900 and 1500 MHz and is electtonically tuned by varactor diodes CR1 and CR2. The oscillator output is isolated from the leveling circuitry and the load by a cascode amplifier (Q2, Q3).

The signal is filtered by a multisection LC low-pass filter. The elements of this filter are PCB printed circuits.

450-1000 MHz oscillator (refer to Figure 4-6 and Schematic Diagram 54-0279-01).

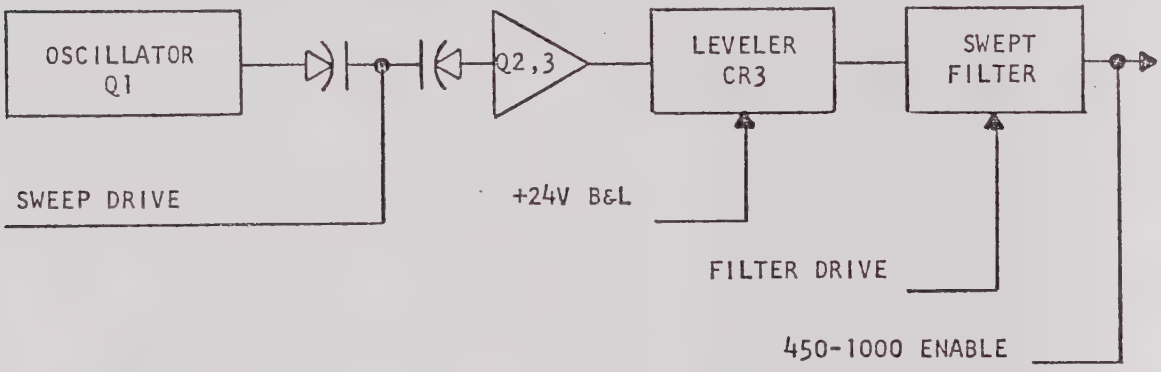


Figure 4-6 Block Diagram, 450-1000 MHz Oscillator

The operation of this oscillator is identical to the 900-1500 MHz oscillator with the addition of a leveler and an electronically tuned filter. The leveler is a PIN diode, whose conductance is varied by the +24V blanked and leveled signal.

1-500 MHz Amplifier Schematic Diagram 54-0305-01).

This amplifier consists of three common emitter transistor stages. Each stage frequency response is adjusted for an optimum overall response.

RDMC (refer to Figure 4-7 and Schematic Diagram 54-0259-01).

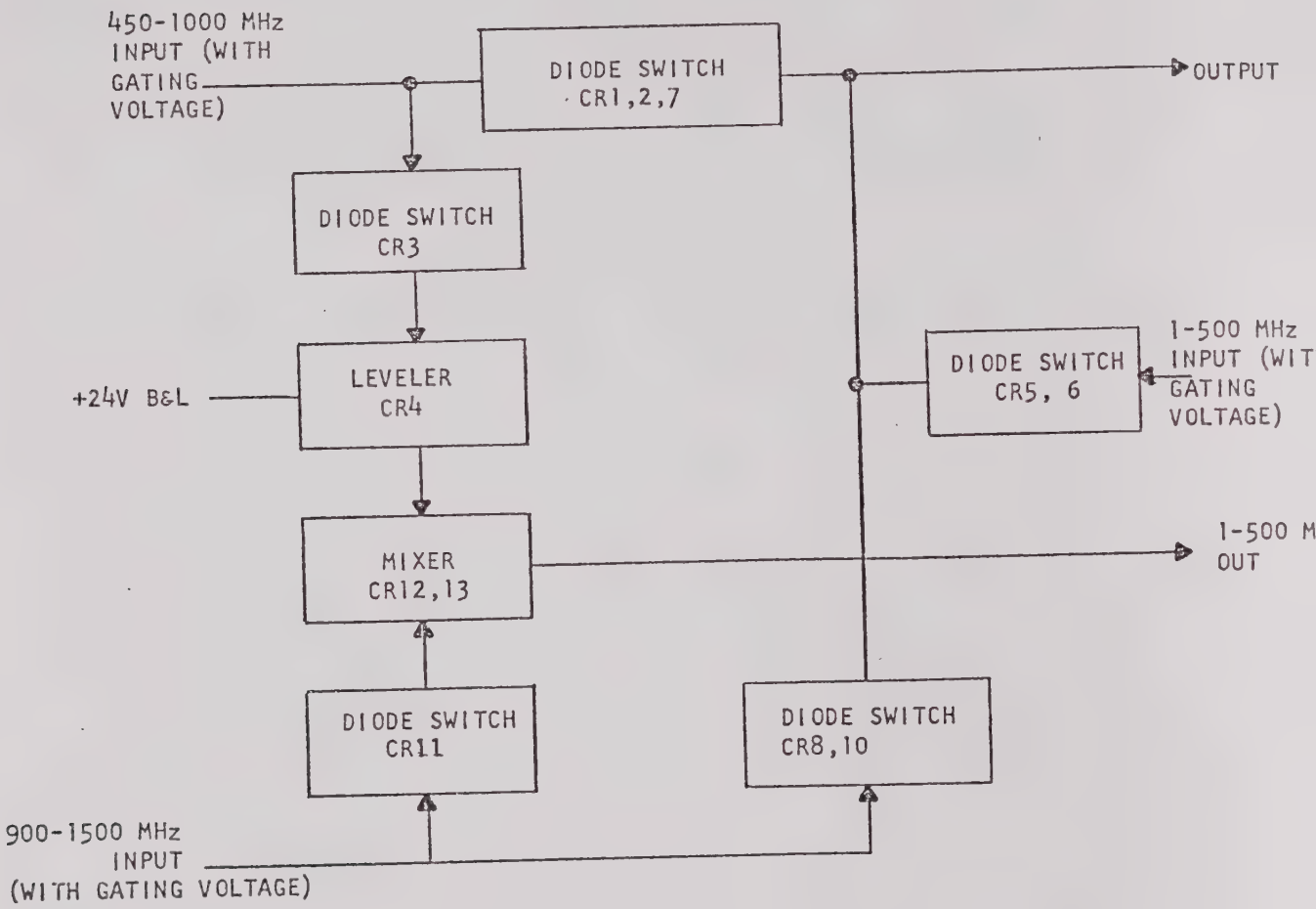


Figure 4-7 Block Diagram, RDMC

In the frequency range of 1 to 500 MHz, positive gating voltages are applied to the outputs of the VCOs. These voltages will forward bias CR3 and CR11, thus applying the RF signals to the mixer. CR1, 2, 7, 8 and 10 are reversed biased. -24V blanked is applied to the output of the 1-500 MHz. This forward biases CR6 during trace connecting the 1-500 MHz signal to the monitor and RF output.

In the frequency range of 500-1000 MHz, -24V blanked is applied to the output of the 450 to 1000 MHz VCO. This forward biases CR1, 2 and 7, connecting the output of the 450 to 1000 MHz VCO to the monitor and RF output. The remaining diode switches are reversed biased.

In the frequency range of 900-1500 MHz, -24V blanked is applied to the output of the 900 to 1500 MHz VCO. This forward biases CR8 and 10, connecting the output of the 900 to 1500 MHz VCO to the monitor and the RF output. The remaining diode switches are reversed biased.

Monitor Module (refer to SchematicDiagram 54-0321-01 and 54-0493-01).

The diode CR2 and its associated circuitry detects the negative peak amplitude of the video amplifier's output. This DC voltage is fed to the automatic leveling circuits in the power supply.

R2 provides the RF output source impedance.

Diode CR1 and its associated circuitry samples the output signal and heterodynes the sample with an external RF signal. The resulting difference frequency is an external birdy marker which is fed to the birdy amplifier and the lateral board.

Birdy Marker Circuitry (refer to Figure 4-8 and Schematic Diagrams 55-8573-01, 54-0269-01, and 54-0510-03).

The Marker Box is a housing and an RF distribution system for up to seven plug-in birdy marker cards. Each marker card consists of a crystal oscillator, a mixer, and an output amplifier. Harmonic marker cards include a harmonic generating stage between the oscillator and mixer. The output of the marker card is the difference frequency resulting from heterodyning the sweep sample with the crystal oscillator. This output, when shaped by a low-pass network, is the "birdy" marker. Further information on the operation of these cards is available in the Model 8015 and 8020 manuals.

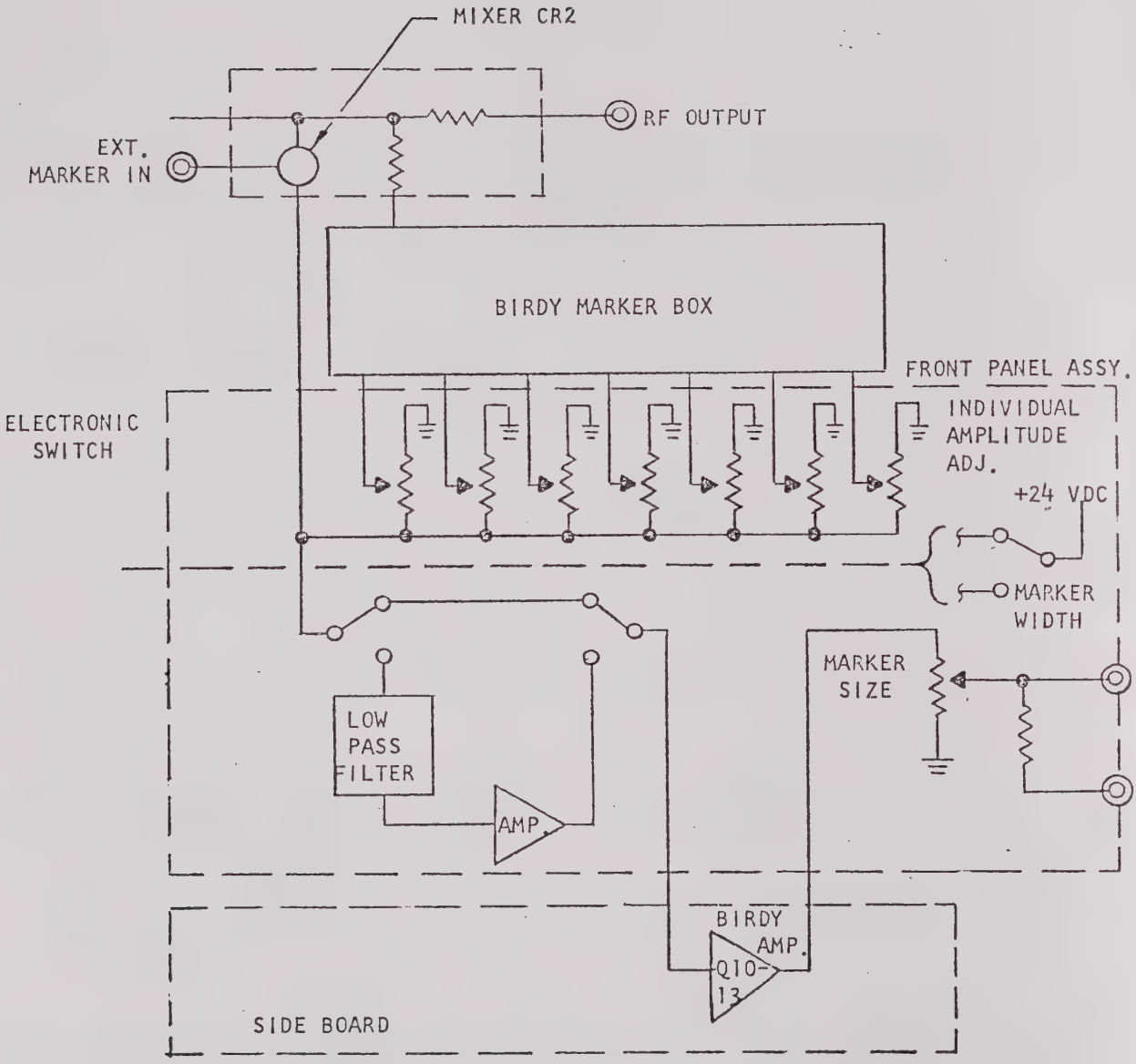


Figure 4-8 Block Diagram, Birdy Marker Circuitry

Each marker card output is routed to a variable resistor on the Front Panel Board. These resistors provide individual amplitude adjustment of each marker, and sums the outputs together along with the external birdy from the monitor module. An electronic switch inserts a low-pass filter to further reduce the birdy width in the NARROW mode. The filter is followed by an amplifier which increases the birdy amplitude to that in the WIDE mode. The output of the switch is amplified. The birdy markers are then routed to the MARKER SIZE potentiometer on the front panel. The markers are superimposed upon the detected signal at the MARKER ADDER OUT connector.

SECTION V MAINTENANCE

5.1 INTRODUCTION

This section covers maintenance, troubleshooting, and adjustment of the Model 1205A/1235A Sweep Generator. A performance check is included which may be used in receiving inspection and periodic calibration tests to verify the instrument meets its specifications.

5.2 SERVICE INFORMATION

Top Cover Removal - Remove the four screws attaching the cover to the chassis.

Rear Panel Assembly (Power Supply) Removal - Remove the four screws attaching the assembly to the chassis.

Lateral Board Removal - Remove the rear panel assembly. The lateral board may then be unplugged from the front panel board.

RF Section Removal - Remove the four screws on the bottom of the chassis which holds the RF Section to the chassis.

Model Pin Identification - Refer to Schematic Diagram 54-0270-01 for pictorial presentation of the module connections.

5.3 PERFORMANCE TESTS

The following procedure is intended to verify the instrument performs in accordance with the specification listed in Section 1 of this manual. Where adjustment is required, refer to paragraph 5.4 of this section for calibration instructions.

The test equipment required to perform these tests are specified in Table 5-1.

Table 5-1 Test Equipment Required

Instrument	Recommended Model	Required Characteristics
Oscilloscope	HP 130C	
RF Detector	Telonic 8551 (50 ohm), 8571 (75 ohm).	
1 and 50 MHz Harmonic Mkrs.	Telonic 8020	
RF Signal Generator	HP 606B	0.1 to 30 MHz at -6dBm output level.
Spectrum Analyzer	HP 8551B/851B	Freq. Range: 10 MHz - 2 GHz
Audio or Function Generator	HP 200CD	25 Volt Peak-to-Peak output amplitude
Frequency Counter	HP 5245L	Measures frequencies up to 50 MHz

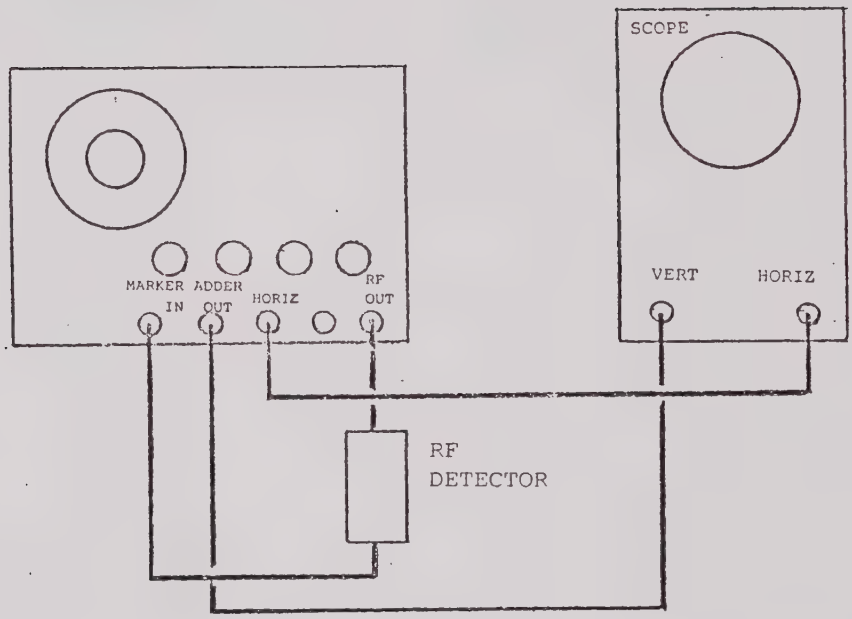


Figure 5-1 Initial Test Setup #1, Performance Test

Initial Test Setup

Insert the harmonic marker cards in the instrument, if not already installed. An alternate method of obtaining these markers is to use an external marker generator, which will sample the RF output of the sweep generator. Telonic Model 2003 system may be used in this application.

Connect the sweep generator, RF detector, and oscilloscope as shown in Figure 5-1. Set the sweep generator controls as follows:

Front Panel	
Band Switch	As required
CENTER FREQ.	Mid-range
SWEEP WIDTH	Maximum (CW)
SWEEP MODE	1 - 50
VERN/MAN	Maximum (CW)
RF LEVEL	Maximum (CW)
Attenuators	0dB
MARKER WIDTH	WIDE
(Marker) Size	Maximum (CW)
50 MHz Markers	ON
All other markers	OFF
Rear Panel	
BLANKING ON/OFF	ON
ALC INT/EXT	INT

The oscilloscope shall be placed in the X-Y mode and adjusted to provide a display as shown in Figure 5-2.

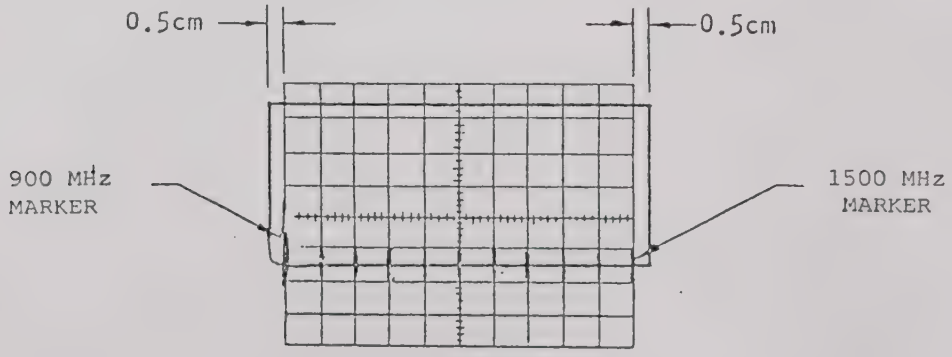


Figure 5-2 Oscilloscope Display

To identify the frequency of any marker on the display, one marker must be positively identified. Either the zero notch or an external marker may be used as a reference to identify the remaining markers. If the external marker source is variable and its frequency can be accurately determined, it may be used as a calibrated variable marker.

Band 1 Frequency Range and Maximum Sweep Width

1. Place the Band Switch to the 1-500 MHz position.

2. With the zero notch at the left edge of the display, the 500 MHz marker (tenth 50 MHz marker) shall be visible at the right edge. This verifies maximum sweep width of 500 MHz.

3. Set the CENTER FREQ. dial to the 500 MHz dial mark. The 500 MHz marker shall be at the center of the display.

4. Set the CENTER FREQ. dial to the 0 MHz dial mark. The zero notch shall be at the center of the display.

5. Turn on the 1 MHz markers and reduce sweep width to approximately 5 MHz. The roll-off at the zero beat shall begin at less than 1 MHz.

Band 1 Minimum Sweep Width

1. Connect the equipment as shown in Figure 5-3.

2. Set the sweep generator controls as follows:

CENTER FREQ.	5 MHz
SWEEP WIDTH	Minimum (CCW)
SWEEP MODE	MAN

3. Set the VERN/MAN control to its CCW position and note the frequency reading of the counter. Set the VERN/MAN control to ist CW position and note the frequency reading. The maximum difference shall be 200 KHz, or less.

4. Set the SWEEP MODE switch to LINE and note the portion of display occupied by a birdy marker.

5. Return the setup to the configuration described in the paragraph on Initial Test Setup.

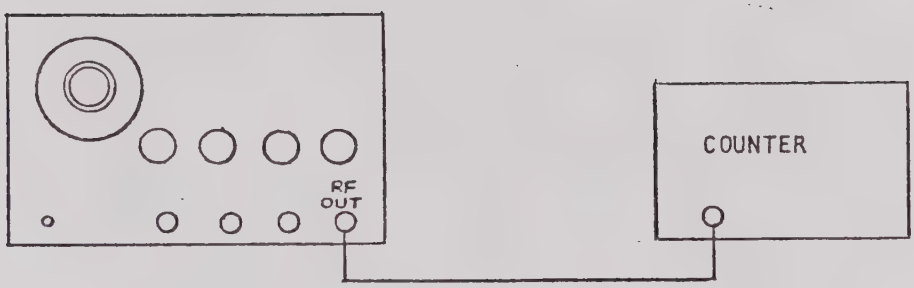


Figure 5-3 Performance Setup #2

Band 2 Frequency Range and Sweep Width

1. Place the Band Switch to the 450-950 MHz position.

2. With the 450 MHz marker at the left edge of the display, the 950 MHz marker shall be visible at the right edge. This verifies maximum sweep width of 500 MHz.

3. Set the CENTER FREQ. dial to the 950 MHz dial mark. The 950 MHz marker shall be at the center of the display.

4. Set the CENTER FREQ. dial to the 450 MHz dial mark. The 450 MHz marker shall be at the center of the display.

5. Set the SWEEP WIDTH control to its minimum (CCW) position.

6. Extrapolate the sweep width by comparing the portion of the display occupied by a birdy marker to that noted in the paragraph on Band 1 Minimum Sweep Width. The sweep width shall be 200 KHz or less.

7. Return the setup to the configuration described in the paragraph on Initial Test Setup.

Band 3 Frequency Range and Sweep Width

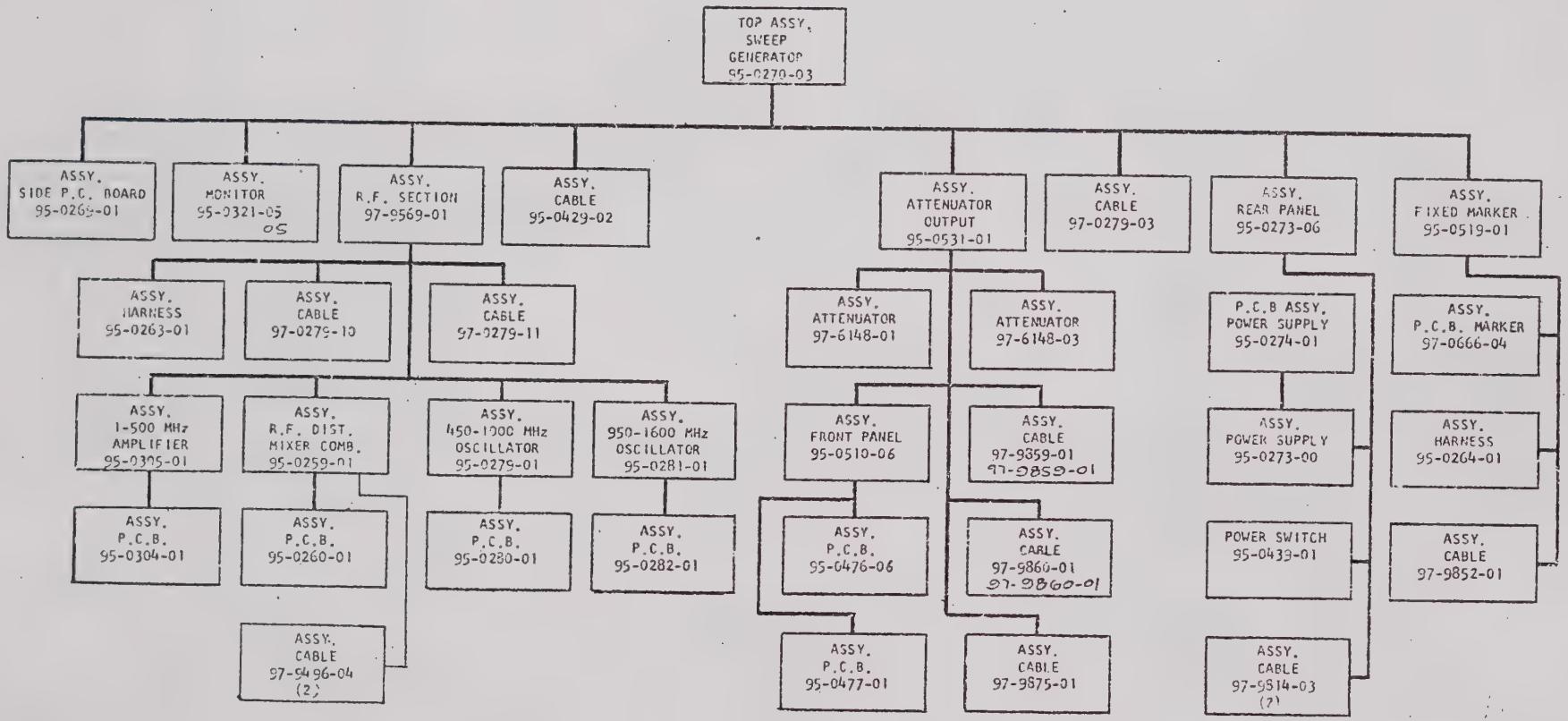
1. Place the Band Switch to the 900-1500 MHz position.

2. With the 900 MHz marker at the left edge of the display the 1500 MHz marker shall be visible at the right edge. This verifies maximum sweep width of 500 MHz.

3. Set the CENTER FREQ. dial to the 1500 MHz dial mark. The 1500 MHz marker shall be at the center of the display.

4. Set the CENTER FREQ. dial to the 900 MHz dial mark. The 900 MHz marker shall be at the center of the display.

5. Set the SWEEP WIDTH control to its minimum (CCW) position.



DRAWING TREE, MODEL 1205A

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	GS	3/11/75
.XX ± .01	CHK		
.XXX ± .005	ENGR	R.L. Kaiser	4/2/75
ANG ± 1°	APVD	C.S.W.P.	4/2/75

TELEDYNE HOUSTON, INC.

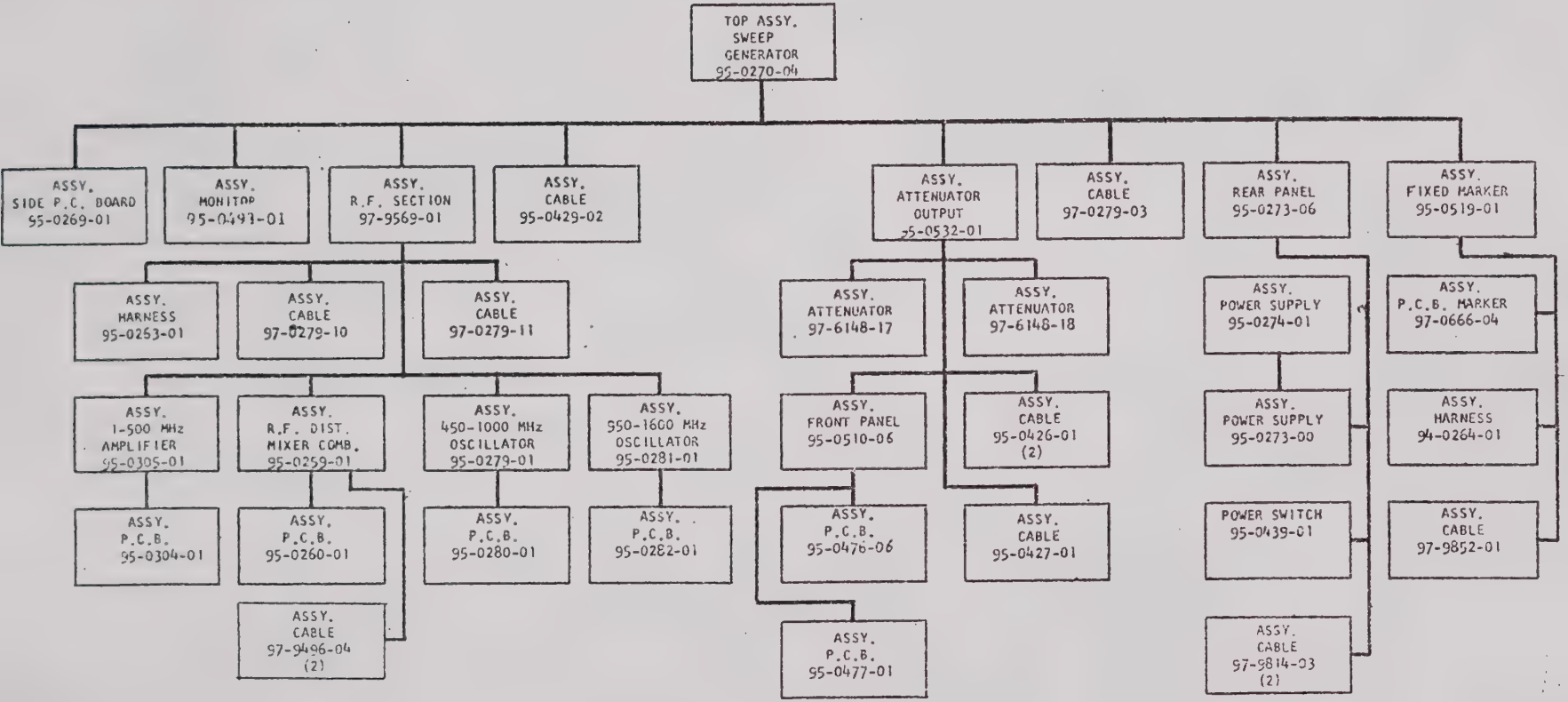
LET	REVISION	DATE

TITLE: ASSY., SWEEP GENERATOR 1205A/1235A

SN 3 01 5 | SIZE B | DWG NO 95-0270-( ) | REV U

REF

B02-6037-01



DRAWING TREE, MODEL 1235A

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	GS	3/11/75
.XX ± .01	CHK		
.XXX ± .005	ENGR	R L K...	3/25/75
ANG. ± 1°	APVD	T...	...

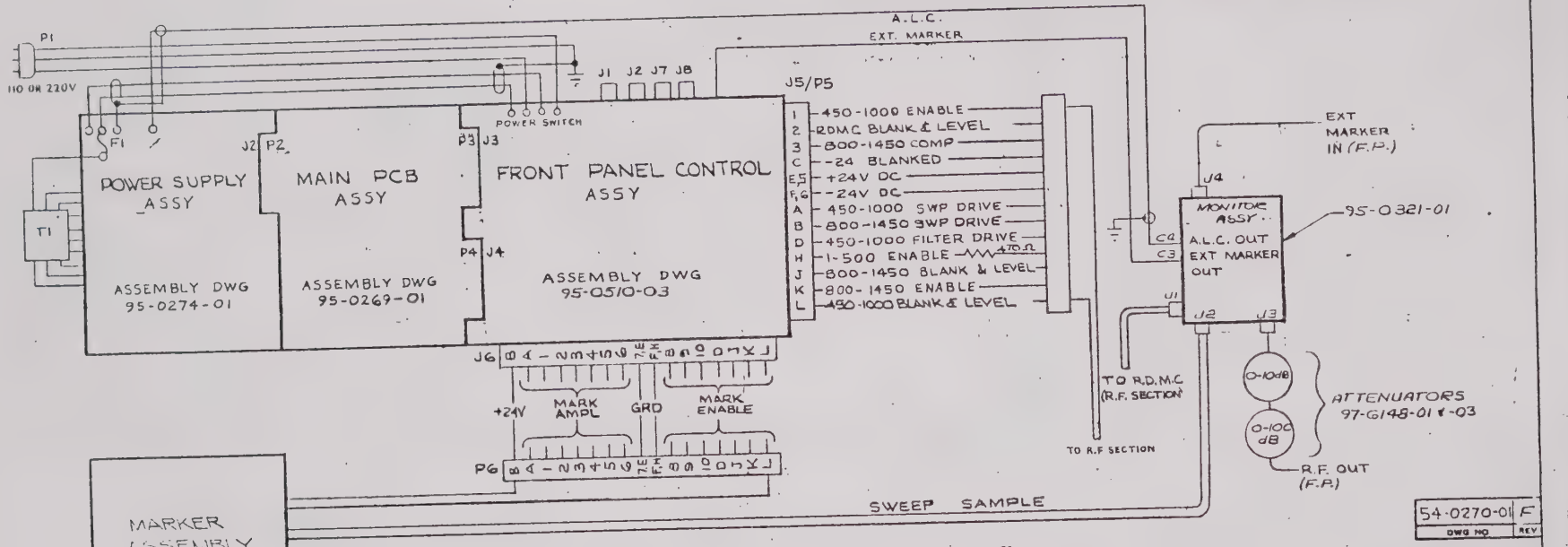
TELONIC INDUSTRIES, INC.
21782 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494 9401 • TWX 910 596 1320

LET	REVISION	DATE

TITLE: ASSY. SWEEP GENERATOR 1205A/1235A

SH 4 OF 5 | REL | SIZE B | DWG NO 95-0270-( ) | REV

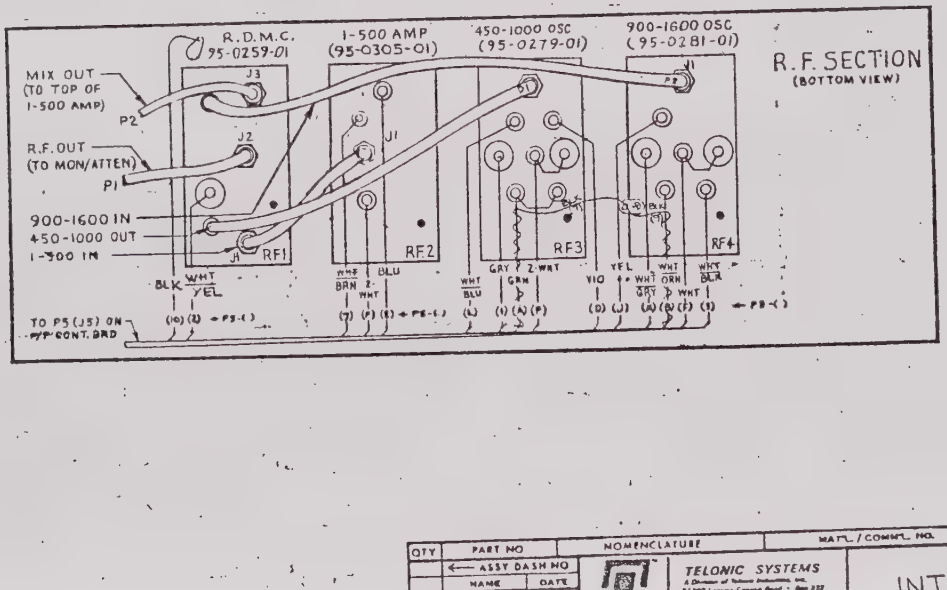
LTR	DESCRIPTION	EFF. DATE	DR	ECN NO.
A	REROUTE A.L.C. LINE TO POWER SUPPLY PCB			
B	95-0305-01 WAS 95-0307-01 & 95-0601	7-14-72	DS	
C	ADDED TWISTED PAIRS FOR SWP. DR.	1-23-73	DS	PER ECN 7218
D	54-0270-00 CHNGD. TO -01 AS ENT. & OUTPUTS DWG. CHANGED TO ROTARY ATTENUATORS	5-9-73	DW	ECN 7324
E	FRONT PNL. ASSY WAS 95-0272-01	2/12/75	DW	ECN 8709
F	MARKER WAS 97-1062-01	2-19-75	DW	ECN 8714



54-0270-01 F
DWG NO. REV

MARKER ASSEMBLY

ASSY DWG 95-0519-01



SCHEMATIC, INTERCONNECTION
C54-0270-01

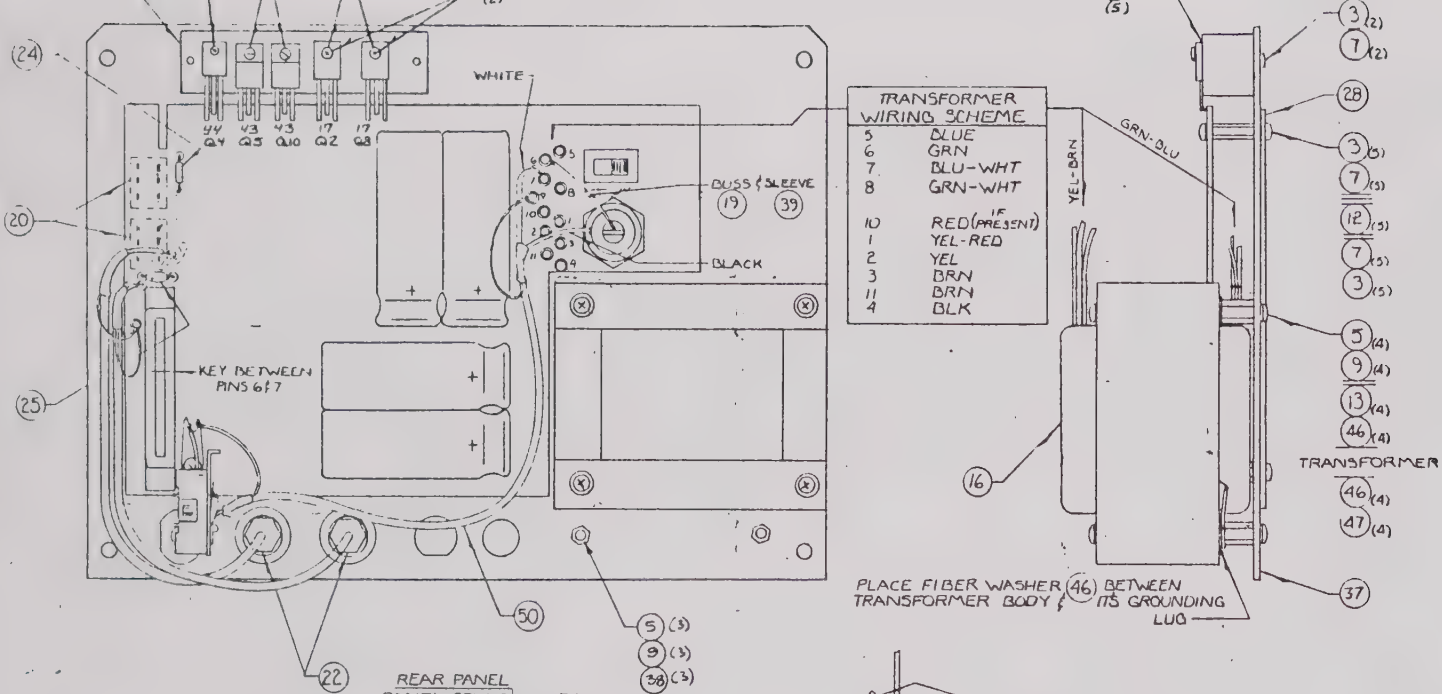
QTY	PART NO	NOMENCLATURE	MATL / COMM'L NO.	FINISH / SOURCE	NOTES
	← ASSY DASH NO				
	NAME / DATE				
DR	S.T. 12-29-72				
CHK	DSA 1-4-73				
ENGR	B.L.KING 5-16-73				
	6-1-73				
	REL TO PROD				

TELONIC SYSTEMS
A Division of Telonic Industries, Inc.
21301 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel. 714/494-9401 • TWX 910/596-1399

TOLERANCES
FRAC ± 1/64
ANG ± 1°
.XX ± .01
.XXX ± .005
AQL
SCALE —

RELEASED D.M. 2/24/73
SHEET 1 OF 2
SIZE C
DRAWING NUMBER 54-0270-01
REV F

SCHEMATIC INTERCONNECTION MODEL 1205A



NOTES:

1. INSTALL TRANSISTORS USING HARDWARE ENCLOSED, LESS MICA WASHER. BENDING LEADS WITH FIXTURE.
2. SLEEVE FUSE HOLDER & POWER SWITCH WITH HEAT SHRINK TUBING — (8)
3. CUT ITEM 48 TO LENGTH REQUIRED FOR EACH TRANSISTOR

-06

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	DALE JONES	5-25-76
.XX ± .01	CHK		
.XXX ± .005	ENGR	R. KLINGER	5/26/76
ANG. ± 1°	APVD	R. KLINGER	5/26/76

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494 9401 • TWX 910 596 1320

LET	REVISION	DATE

TITLE: ASSY- REAR PANEL 1300

SH 4 OF 5	SIZE	DWG NO	REV
REEL	C	95-0273-(1)	43

AM

6. Extrapolate the sweep width by comparing the portion of the display occupied by a birdy marker to that noted in the paragraph on Band 1 Minimum Sweep Width. The sweep width shall be 200 KHz or less.

7. Return the setup to the configuration described in the paragraph on Initial Test Setup.

RF Output Level

1. Return the setup to the configuration described in the paragraph on Initial Test Setup.

2. Verify the RF output level, as indicated by the RF detector, is equal to or greater than 0.5 volts rms across the full sweep width.

   NOTE: The RF detector may be calibrated with an RF power meter as follows:

   (a) Set the sweep generator for CW operation.

   (b) With the RF power meter connected to the RF output, note the output.

   (c) Replace the power meter with the detector, and note the DC level.

   (d) Repeat for various RF output levels.

3. Insert 3dB of attenuation, and note the detected level. Remove the 3dB of attenuation.

4. Set the RF LEVEL to its minimum setting. The detected level shall be the same as that in the previous step. Return the RF LEVEL to its CW position.

5. Repeat for the other two center frequency bands.

Flatness

1. Insert 1dB of attenuation and note the difference in the displayed level. Remove the attenuation.

2. Note the difference between the maximum and minimum amplitude points in the detected level. This level variation shall be less than the change noted in Step 1. This corresponds to ±0.5dB.

3. Repeat for the other two center frequency bands. The 1235A has a ±1.0dB specification on Band 3.

Spectral Purity

1. Set the sweep generator controls as stated in the Initial Test Setup, except as follows:

SWEEP MODE	MAN.
Attenuators	10dB

2. Connect the test equipment as shown in Figure 5-4.

3. Adjust the VERN/MAN control over its entire range. Harmonic signal levels shall be at least 30dB below the fundamental output signal. Spurious signal levels shall be 30dB down.

4. Repeat for the other two center frequency bands.

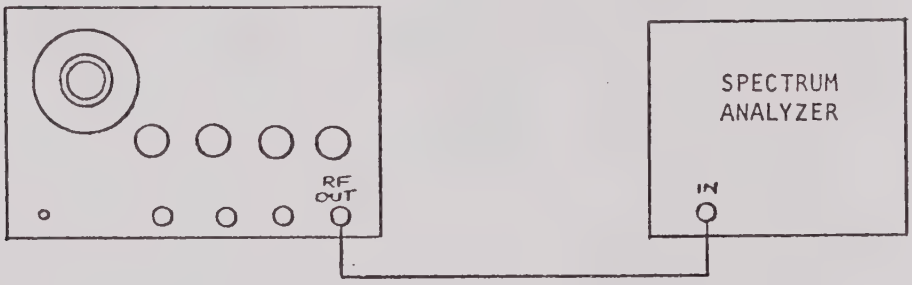


Figure 5-4 Performance Setup #3

Linearity

1. Return test setup to that described in the Initial Test Setup paragraph.

2. Locate the shortest interval between 50 MHz markers. Adjust the horizontal gain of the oscilloscope so this occupies exactly one centimeter of the display.

3. Adjust CENTER FREQ. until the longest marker interval is located. The length of this interval indicates the linearity ratio and must be 1.1 centimeters or less.

4. Repeat for the other two center frequency bands.

5. Adjust the oscilloscope horizontal gain for a 10 cm display.

Dial Accuracy

1. Turn the 1 MHz harmonic markers on.

2. Reduce SWEEP WIDTH to 2 MHz in a 10 cm display.

3. Set the CENTER FREQ. dial to center each 50 MHz marker. Verify the corresponding 100 MHz dial calibration is within 10 MHz of dial setting.

Residual FM

1. Reduce sweep width to 1 MHz.

2. Note the "vibration" of the markers. This vibration shall be less than 0.2 cm peak-to-peak. This corresponds to 20 KHz max. of residuel FM.

3. Repeat for the other two center frequency bands.

Drift

1. Connect the equipment as shwon in Figure 5-3.

2. Set CENTER FREQ. to 20 MHz.

3. Note the frequency readout at the start of a five minute period and at the end of the period. The difference shall be less than 200 KHz.

4. Note the frequency readout at the start of an eight hour period and at the end of the period. The difference shall be less than 2 MHz.

Sweep Rate and Horizontal Voltage

1. Connect the test equipment as shown in Figure 5-5 and set the oscilloscope internal time base for a display of at least one full cycle of the horizontal output waveform.

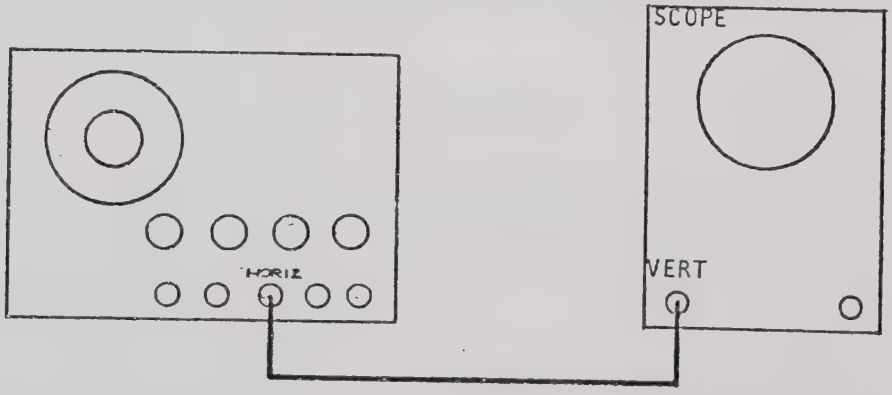


Figure 5-5 Performance Setup #4

2. Set the sweep generator controls as described in the Initial Test Setup paragraph, except set VERN/MAN fully CW.

3. The horizontal output waveform shall be a sawtooth between -10 volts and +10 volts.

4. The period of the waveform shall be less than 20 millisecond (frequency greater than 50 Hz). Set VERN/MAN fully CCW. The period shall be approximately 2 seconds.

5. Place SWEEP MODE to 01-1 and VERN/MAN fully CW.

6. The period shall be approximately 1 second. Set VERN/MAN fully CCW. The period shall be greater than 100 seconds.

7. Place SWEEP MODE to LINE. The sawtooth shall be free of jitter and have the same peak amplitudes (within 10%) as that measured in step 3. The frequency shall be same as the AC power line frequency.

8. Place SWEEP MODE to MAN and VERN/MAN fully CCW. The DC voltage shall be the same as the negative peak amplitude measured in step 3. Set VERN/MAN fully CW. The DC voltage shall be the same as the positive peak amplitude measured in step 3.

9. Place SWEEP MODE to EXT. Set the oscilloscope to the X-Y mode, with the vertical input connected to the MARKER ADDER OUT of the sweep generator, and the horizontal input connected to HORIZ.

10. With the audio generator set for a 25 volt P-P output at 100 ±5 Hz, the sweep width shall be greater than 500 MHz.

Blanking

1. Return the test setup to that described in the Initial Test Setup paragraph.

2. Place the rear panel BLANKING ON/OFF switch to OFF. The RF output shall remain on during retrace. Place the switch to ON.

AM Modulation

1. Set the audio generator for an output of 10 volts P-P and connect it to the AM input of the sweep generator.

2. Verify the detected output indicates AM modulation at 30% or greater for frequencies between 100 Hz and 1 KHz.

3. Disconnect the audio generator from the sweep generator.

Birdy Marker System

1. Connect the RF signal generator to the EXT. MARKER input on the sweep generator.

2. Turn on each birdy marker (other than those installed for these performance tests) individually. Verify operation and frequency of each marker per the following steps:

   a) The P-P amplitude shall be 1 volt minimum for single frequency markers and 0.2 volts minimum for harmonic markers.

   b) The minimum peak amplitude to noise ratio is 10:1 and 5:1 for single frequency and harmonic markers, respectively.

   c) The minimum marker amplitude to spurious marker ratio is 5:1 and 3:1 for single frequency and harmonic markers, respectively.

   d) Adjust the frequency of the signal generator until the external birdy is superimposed upon the marker to be checked.

   e) Measure the output frequency of the signal generator with the counter.

3. With the output level of the signal generator set at -6dBm, the minimum external birdy amplitude is 0.5 volt P-P.

4. The marker width is 100 KHz P-P nominal and 20 KHz P-P maximum in the wide and narrow modes, respectively.

5.4 CALIBRATION AND ADJUSTMENT

Remove the top cover of the instrument. Refer to Figure 5-6 for the location of the internal controls.

In general, calibration must be performed in the sequence given. The sweep generator controls shall be set as described in the Initial Test Setup (in the previous part of this section).

+24 VDC Adjustment

Connect a digital voltmeter to TP1 of the Power Supply Board. Adjust R4 on the Power Supply Board for a reading of +24 VDC (+23.9 to 24.1 VDC).

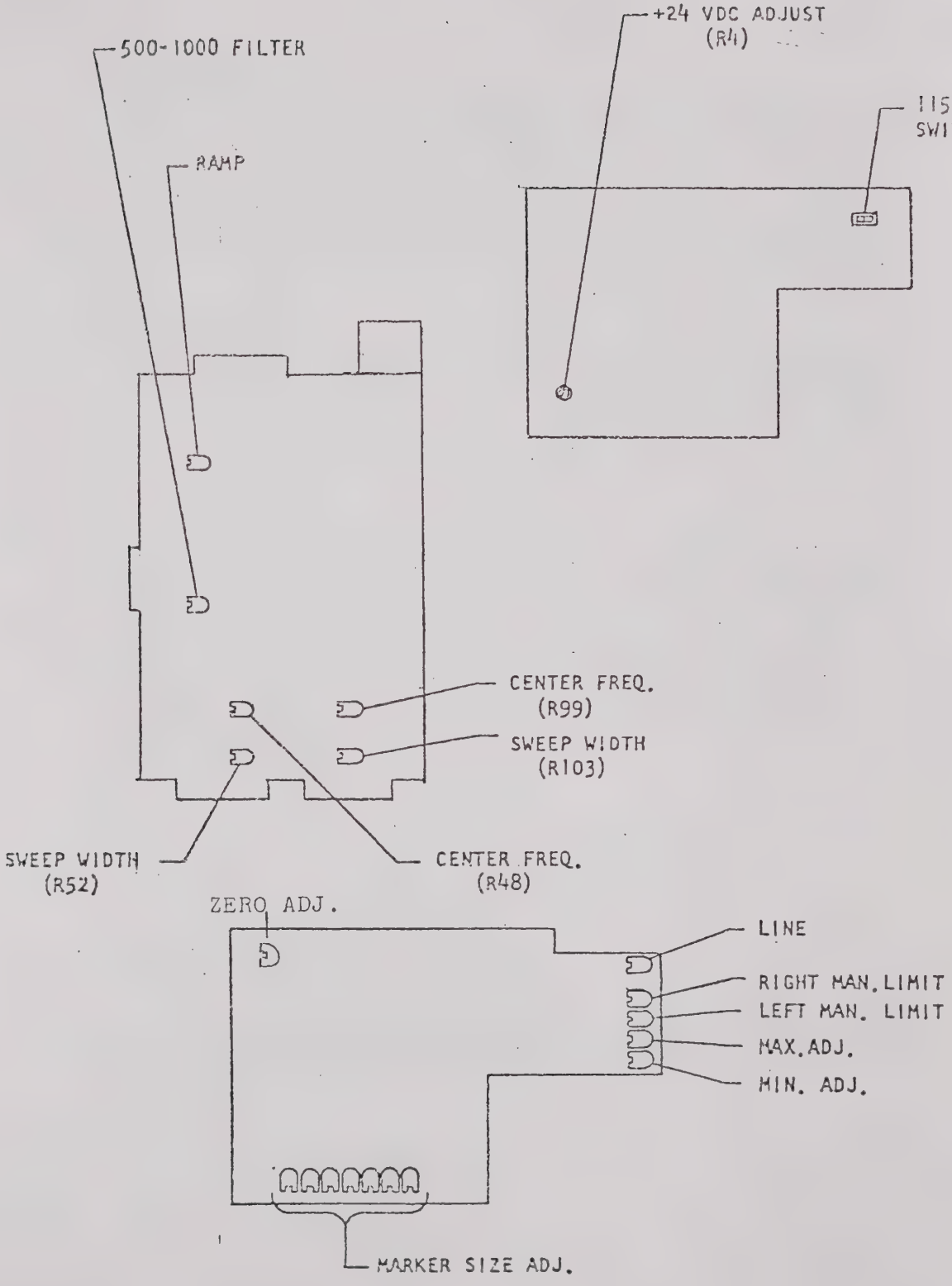


Figure 5-6 Internal Controls

-24 VDC Check

Connect the digital voltmeter to TP3 of the Power Supply Board and verify a reading of -24 VDC (-23.6 to -24.4 VDC).

Ramp Symmetry Adjust

Connect the oscilloscope to TP 9 of the Side Board. Adjust the RAMP trim pot on the Side Board until the sawtooth is symmetrical about 0 VDC.

Line Rate Adjust

Connect the oscilloscope to TP9 of the Side Board. Note the peak amplitudes of the sawtooth. Place the SWEEP MODE switch to LINE. Adjust the LINE trim pot on the Front Panel Board until the sawtooth is free of jitter and has the same limits as previously noted.

Manual Sweep Adjust

Connect the oscilloscope vertical input to the HORIZ OUT connector. Note the peak amplitudes of the sawtooth. Place the SWEEP MODE switch to MAN. Set the VERN/MAN control fully CCW and adjust R15 (left man. limit) on the Front Panel Board until the DC output voltage equals the negative peak amplitude of the sawtooth. Set the VERN/MAN control fully CW and adjust R17 (RIGHT MAN. LIMIT) on the Front Panel Board until the DC output voltage equals thepositive peak amplitude. Repeat until the manual sweep limits are the same as the rate generator output.

NOTE

For the remaining adjustments, connect the test equipment per Figure 5-1, unless otherwise specified.

450-950 MHz Sweep Drive Adjustments

Set the B nd Switch to the 450-950 MHz position. Adjust the CENTER FREQ. (R52) and SWEEP WIDTH (R48) trim pots on the Side Board until a sweep range of 450-950 MHz is displayed.

450-950 MHz Dial Calibration

Set the CENTER FREQ. dial to 450 MHz and reduce the SWEEP WIDTH to 10 MHz, keeping the 450 MHz marker centered on the display with the CENTER FREQ. (R52) trimpot. Set the CENTER FREQ. dial to 600 MHz and adjust the SWEEP WIDTH (R48) trimpot to center the 600 MHz marker. Repeat until the 450 MHz and 600 MHz markers are centered on the display at their respective CENTER FREQ. dial settings.

900-1500 MHz Sweep Drive Adjustments

Set the Band Switch to the 900-1500 MHz position. Adjust the CENTER FREQ. (R103) and SWEEP WIDTH (R99) trimpots on the Side Board until a sweep range of 450-1000 MHz is displayed.

Linearity Adjustments

The linearity is preset at the factory.

900-1500 MHz Dial Calibration

Set the CENTER FREQ. dial to 900 MHz and reduce the SWEEP WIDTH to 10 MHz, keeping the 900 MHz marker centered on the display with the CENTER FREQ. (R103 trimpot. Set the CENTER FREQ. dial to 1200 MHz and adjust the SWEEP WIDTH (R99) trimpot to center the 1200 MHz marker. Repeat until the 900 MHz and 1200 MHz markers are centered on the display at their respective CENTER FREQ. dial settings.

1-500 MHz Dial Calibration

Set the CENTER FREQ. dial to 250 MHz and reduce the SWEEP WIDTH to 1 MHz. Adjust the ZERO (R48) on the Front Panel Board until the 250 MHz marker is centered on the display.

Minimum and Maximum RF Level Adjustments

Set RF LEVEL fully CW and adjust R44 (MAX ADJUST) on the Front Panel Board for 0.5 volts rms output as indicated by the detector. Set RF LEVEL to the minimum setting and adjust R42 (MIN ADJUST) on the Front Panel Board for output 3dB less than the maximum level.

Birdy Marker Adjustments

Seven MARKER SIZE trimpots on the Front Panel Board provide individual control of the output amplitude of each marker card. These may be adjusted as desired to distinguish one marker from another.

5.5 TROUBLESHOOTING

This section is provided to aid in the location of failures which may be encountered with this instrument. It is anticipated that this section will be used in conjunction with Sections IV and VI during troubleshooting and repair.

Table 5-2 lists symptoms and probably causes of various malfunctions.

Table 5-2 Troubleshooting Chart

Symptom	Probable Cause
1. Pilot light does not illuminate.	A. Line fuse open. B. AC power source off.
2. No HORIZ Output.	A. ±24 VDC supplies inoperative. B. SWEEP MODE switch in EXT. C. E3 or Q6-9 bad (check TP9 for sawtooth).
3. +24 VDC absent	A. +24 VDC line shorted to ground. B. E1 bad.
4. -24 VDC absent	A. +24 VDC supply inoperative. B. -24 VDC line shorted to ground. C. E2 bad. D. R21 burned.
5. HORIZ output in LINE mode unstable or has incorrect amplitude.	A. Adjust LINE trimpot.
6. No RF output.	A. ±24 VDC supplies inoperative. B. Either attenuator in the "open" position adjacent to the 0dB position. C. Open RF cabling. D. An inoperative RF module.
7. Insufficient RF output	A. MAX LEVEL trimpot improperly adjusted. B. Leveling circuitry not functioning. C. Bad RF module.
8. No RF sweep.	A. Sweep Drive circuitry faulty. B. CR1 and CR2 of VCOs faulty.
9. Birdy Markers absent.	A. No RF output. B. No sweep sample from monitor module. C. +24 VDC to marker box absent. D. Birdy amplifier faulty. E. -24 VDC blanked voltage absent.
10. Leveling Circuitry not functioning.	A. Rear Panel ALC INT/EXT switch in EXT position. B. Broken wire to feedthru capacitor on Monitor Module.

SECTION VI ASSEMBLY DRAWINGS, PARTS LISTS, AND SCHEMATIC DIAGRAMS

Assembly drawings, parts lists, and schematic diagrams are contained within this section for repairable subassemblies of the Model 1205A/1235A.

6.1 INDEX OF DRAWINGS

These drawings are in the following order:

	Drawing No.	Page No.
"Assembly Tree"	95-0270-( )	6-4A,B
Interconnection Schematic	54-0270-01	6-5
Power Supply Assembly:		
Rear Panel Assembly	95-0273-06	6-6A
Parts List	"	6-6B
PCB Assembly	95-0274-01	6-7A
Parts List	"	6-7B
Schematic Diagram	54-0273-01	6-8
Side P.C. Board Assembly:		
PCB Assembly	95-0269-01	6-9A,B
Parts Lists	"	6-10A,B
Schematic Diagrams	54-0269-01	6-11,12
Front Panel Assembly:		
PCB Assembly	95-0476-06	6-13
Parts Lists	"	6-14A,B
Schematic Diagram	54-0510-04	6-15
Marker Shaper Assembly:		
PCB Assembly	95-0477-01	6-16
Parts List	"	6-17
Schematic	54-0477-01	6-18
900-1600 MHz Oscillator Assembly:		
PCB Assembly	95-0282-01	6-19
Parts List	"	6-20
Schematic Diagram	54-0281-01	6-21
450-1000 MHz Oscillator Assembly:		
PCB Assembly	95-0280-01	6-22
Parts List	"	6-23
Schematic Diagram	54-0279-01	6-24
RF Distribution/Mixer/Combiner:		
PCB Assembly	95-0260-01	6-25
Parts List	"	6-26
Schematic Diagram	54-0259-01	6-27
1-500 MHz Amplifier Assembly:		
PCB Assembly	95-0304-01	6-28
Parts List	"	6-29
Schematic Diagram	54-0305-01	6-30

		Page No.
Monitor Assembly(1205A):		
Module Assembly	95-0321-05	6-31
Parts List	"	6-32
Schematic Diagram	54-0321-01	6-33
Monitor Assembly(1235A):		
Module Assembly	95-0493-01	6-34
Parts List	"	6-35
Schematic Diagram	54-0493-01	6-36
Marker Assembly:		
Assembly	95-0519-01	6-37
Parts List	"	6-38
Schematic Diagram	55-8573-01	6-39

6.2 DRAWING PRACTICES

Table 6-1 specifies the abbreviations used for components in Telonic parts lists and schematic diagrams.

Unless otherwise specified, values shown on the schematic diagrams are:

Resistors - Ohms
Capacitors - Picofarads (pF)
Inductors - Microhenries (μH)

	TELONIC INDUSTRIES, INC.	Title: USE OF ABBREVIATIONS	619	
	STANDARD PROCEDURE	TABLE 6-1	Page 1 of 1	

Signature	Date	Dist: ENGINEERING DEPARTMENT
KERANEN	10.26.70	
RHCornick	10.26.70	
Pate	1/28/71	
KERANEN	10-1-71	

1.0 SCOPE

This document describes and defines standard abbreviations to be used in all Telonic Industries drawings and communications.

2.0 Purpose

To establish a uniform list of standard abbreviations.

3.0 LIST OF ABBREVIATIONS

3.1 Prefixes

3.1.1 Multiple

Number	Prefix	Abbrev.
10^9	GIGA	G
10^6	MEGA	M
10^3	KILO	K

3.1.2 Submultiple

Number	Prefix	Abbrev.
10^{-3}	MILLI	m
10^{-6}	MICRO	u
10^{-9}	NANO	n
10^{-12}	PICO	p

3.2 Units

Unit	abbrev.
HERTZ	Hz
AMPERE	A
WATT	W
VOLT	V
FARAD	F
HENRY	H
OHM	

3.3 Unless Specified
Resistors are 1/4 watt in ohms.
Capacitors are in pF.

3.4 Colors.

Color	Abbrev.
BLACK	BLK.
RED	RED
BLUE	BLU.
WHITE	WHT.
GREEN	GRN.
ORANGE	ORN.
VIOLET	VIO.
BROWN	BRN.
YELLOW	YEL.
GRAY	GRA.

3.5 Miscellaneous

DECIBEL	dB
FREQUENCY CONTROLLED VOLTAGE	FCV
FACTORY SELECTED VALUES	FSV
GROUND	GRD.
NOT ASSIGNED	NA
PART OF	PO
PEAK-TO-PEAK	P-P
SAME AS	SA
SUBJECT TO CHANGE	SC

3.6 Component Designations

Component	Part Description	Circuit Reference
Capacitors:		
Fixed Ceramic	CFC	C
Fixed Ceramic Feed-Thru	CFCF	C
Fixed Discap	CFD	C
Fixed Electrolytic	CFE	C
Fixed Metal Film	CFF	C
Fixed Mica	CFM	C
Fixed Mylar	CFMY	C
Fixed Composition	CFN	C
Fixed Oil	CFO	C
Fixed Paper	CFP	C
Fixed Polyester	CFPE	C
Fixed Teflon	CFT	C
Fixed Tantalum	CFTA	C
Trimmer, Ceramic, Disc	CTCD	C
Trimmer, Ceramic, Tubular	CTCT	C
Variable, Air	CVA	C
Variable, Glass-dielectric	CVG	
Printed		CP
Circuit Breakers	CKT BKR	S
Crystals	XTAL	Y
Diodes:		
Semiconductor	DS	CR
Semiconductor, Tunnel	DST	CR
Semiconductor, Varactor	DSV	CR
Semiconductor, Zener	DSZ	CR
Fuses	--	F
Inductors:		
Fixed	IF	L
Variable	IV	L
Printed		LP
Integrated Circuits:		
Digital	ICD	E
Linear	ICL	E
Lamps, Indicator	LI	DS
Meters	--	M
Plugs, Cable	PC	P
Power Supplies	PWR SUP	PS
Printed Circuit Boards	PCB	PCB
Receptacles, Jack	RJ	J
Resistors:		
Fixed Composition	RFC	R
Fixed Carbon Film	RFCF	R
Fixed Metal Film	RFMF	R
Fixed Wirewound	RFWW	R
Variable, Composition	RVC	R
Variable, Dual Composition	RVDC	R
Variable, Dual, Wirewound/Composition	RVDWW	R
Voltage Variable (Varistor)	RVV	R
Variable, Wirewound	RVWW	R
Switches:		
Rotary	SWR	S
Slide	SWS	S
Toggle	SWT	S
Terminator Cables	TC	--
Test Points	TP	TP
Time Delay	TD	--
Transformers, Power	XFMR	T
Transistors	TR	Q
Field Effect	TRFE	Q
Tubes, Electron	TE	V
Wires	--	W

QUANTITY 09	08	07	06	05	04	03	02	01	00	ITEM	PART NUMBER	DESCRIPTION
			1200 Series	Obsolete	1019	1006, 1011, 1030	1011-IF	Obsolete	Obsolete			
			1			1	1			1	95-0274-01	Ass'y. PCB Power Supply
			1		1	1	1			2	02-7004-04	Screw PH #4-40 x 1/4
			14		14	14	14			3	02-7006-04	Screw PH #6-32 x 1/4
			2		2	2	2			4	02-1009-01	Screw PH #6-32 x 1/4 Nylon
			7		7	7	7			5	02-7008-06	Screw PH #8-32 x 3/8
			1		1	1	1			6	03-1029-01	Lockwasher, Ext. #4
			12		12	12	12			7	03-1038-01	Lockwasher, Int. #6
			AR		AR	AR	AR			8	00-5112-06	Shrink Tubing
			7		7	7	7			9	03-1046-01	Lockwasher, Int. #8
					2					10	03-1565-04	Pop Rivet
					2					11	03-1565-10	Pop Rivet
			5		5	5	5			12	03-1545-01	Spacer, Swage Type
			4		4	4	4			13	03-1546-01	Spacer, Hex #8-32 x 7/8
			1		1	1	1			14	09-0552-01	Spacer, Transistor
			1		0	0	1			15	96-5599-01	Rear Panel F/F 14-0794-01
			1		1	1	1			16	94-0075-01	Transformer
			2		2	2	2			17	40-0103-01	TR, MJE3055 Q2,8
			1		1	1	1			18	11-0299-01	Label, 1 Amp
			AR		AR	AR	AR			19	43-0043-01	Jumper Wire
			2				2			20	37-0170-01	Switch, Blanking & AM
			1			1				21	95-0439-01	Power Switch
			2				2			22	97-9814-03	Cable Assy AM, ALC
			2		2	2	2			23	03-1570-01	Washer, Domed
			1				1			24	26-1507-01	RFC 47K 1/4W 5%
			1				1			25	22-0170-01	CFD, .1uF 10v.
			1			1				26	09-0106-01	Solder Lug
			1			1	1			27	09-0075-01	Grommet, Str. Rel.
			1							28	14-0780-01	Cover, Rear Panel
			1			1	1			29	43-0046-03	Cord, Power
					1					30	13-0633-01	Line Filter Cover
					1					31	14-0780-02	Rear Panel Cover
					1					32	09-0074-01	Grommet
					A/R					33	43-0030-01	Cable
					1					34	15-0261-01	Line Filter
					1					35	44-0174-01	Connector
					1					36	95-0274-02	Assy. PCB Power Supply
			0		1	1	0			37	14-0794-01	Rear Panel
			3		3	3	3			38	03-1531-01	Nut, Hex, #8-32
			AR		AR	AR	AR			39	00-1045-01	Teflon Tubing 196A
										40		
			1							41	11-0311-01	Label
										42		
			2		2	2	2			43	40-0104-01	TR 2N5296 Q5,10
			1		1	1	1			44	40-0055-01	TR MJE371 Q4
										45		
			8		8	8	8			46	03-1073-01	Fiber Washer #8
			4		4	4	4			47	02-7008-32	Screw PH #8-32 x 2
			5		5	5	5			48	09-4645-01	Insulator, Thermal
										49		
			AR			AR				50	43-0109-01	Wire, Shielded, 2 Conductor
										51		
										52		
										53		
										54		

BY
CHK
ENG
NAME
DALE JONES
DATE
5-26-76

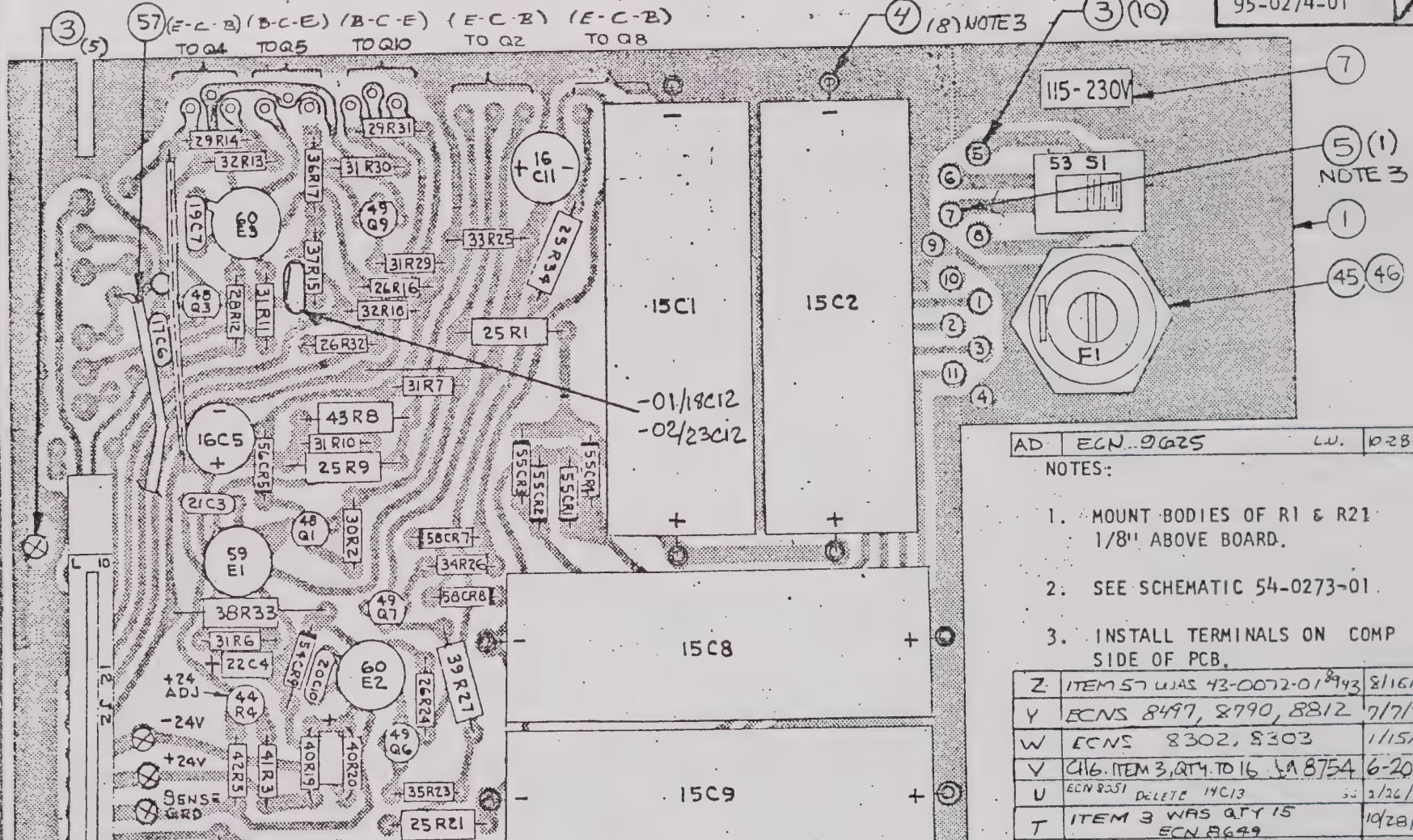
TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652

PARTS LIST

TITLE
Ass'y, Rear Panel

SIZE
DWG NO
REV

SH 5 OF 5



AD	ECN 9625 L.W.	10-28-77

NOTES:

1. MOUNT BODIES OF R1 & R21 1/8" ABOVE BOARD.
2. SEE SCHEMATIC 54-0273-01.
3. INSTALL TERMINALS ON COMP SIDE OF PCB.

Z	ITEM 57 WAS 43-0072-01 ECN 8943	8/16/76
Y	ECNS 8497, 8790, 8812	7/7/76
W	ECNS 8302, 8303	1/15/76
V	C16, ITEM 3, QTY. TO 16 ECN 8754	6-20-75
U	ECN 8251 DELETE 14C13	2/26/75
T	ITEM 3 WAS QTY 15 ECN 8649	10/28/74
S	DELETE Q4,5,10 ECN 8628	9-25-74
R	DELETED jumper ECN 7887 URL	9/29/74
Q	CHNG note #1 ECN7705 PJ	3/12/74
P	Redrawn ECN#7413	9/20/73
LET	REVISION	DATE

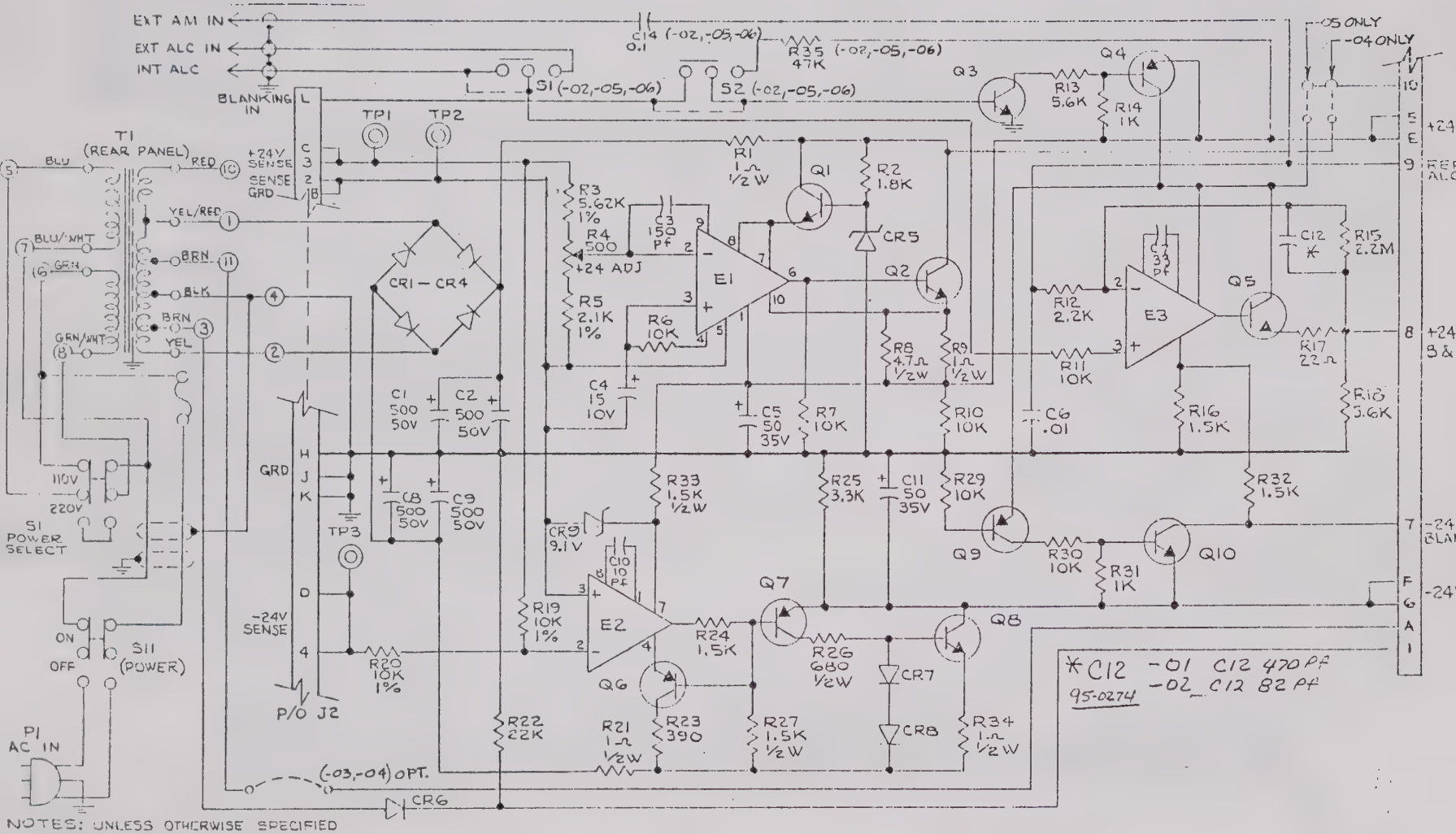
AC	ECN 9478	7-18-77	AB	ECN 9463	6-29-77
AA	ECN 9148	13/15/76			

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	B H PERKINS	9/20/73
.XX ± .01	CHK		
.XXX ± .005	ENG		
ANGLES ± 1°	MFG		

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652

TITLE
PCB ASSEMBLY
POWER SUPPLY

SH	SIZE	DWG NO	REV
1 OF 2			

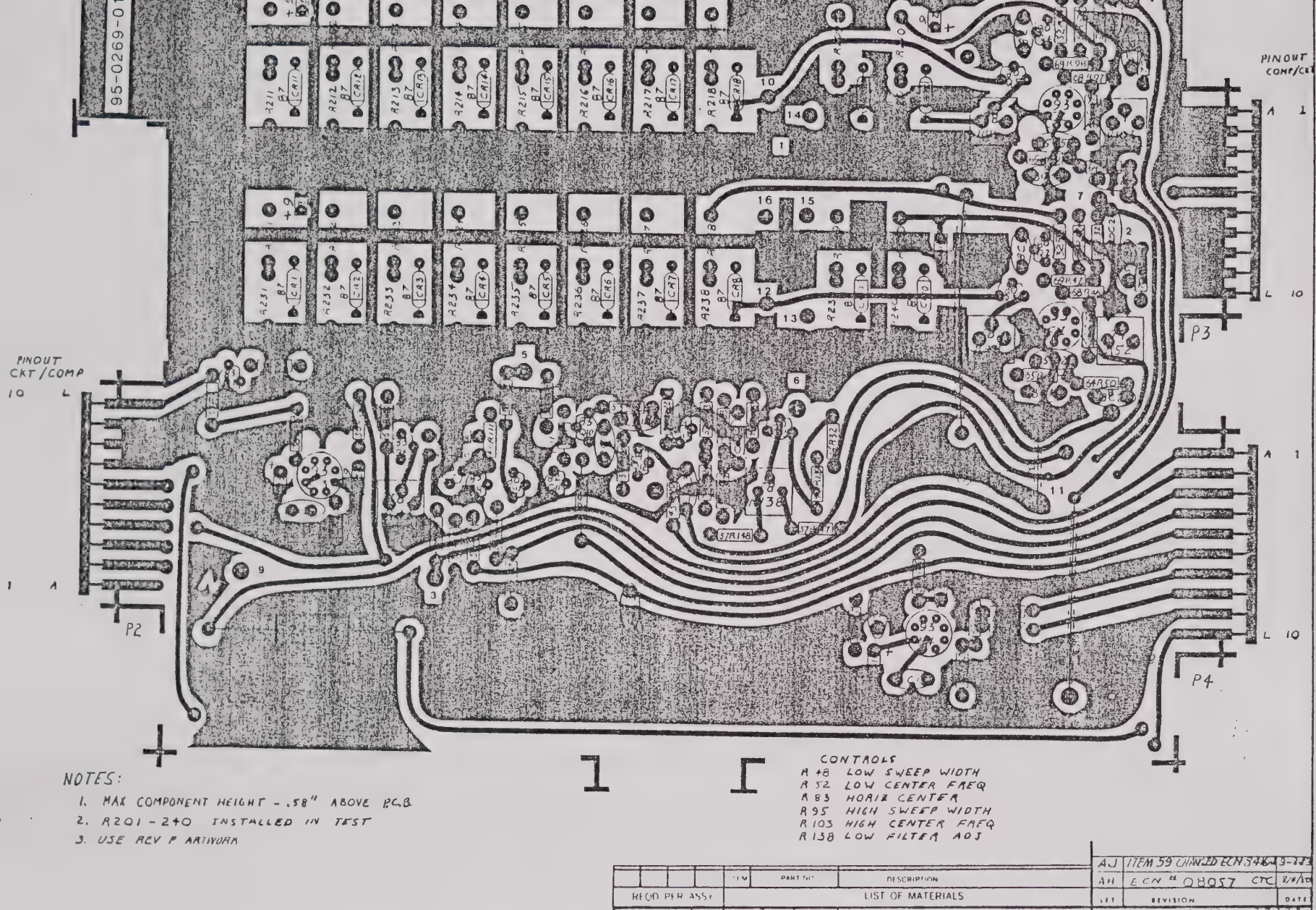


NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITOR VALUES IN MICROFARADS.
2. RESISTOR VALUES IN OHMS, ±10%, ¼ WATT.
3. Q2 & Q8 ARE MJE 3055, TELONIC #40-0103-01
4. T1 IS TELONIC #34-0075-01.

SCHEMATIC - POWER SUPPLY

B54-0273-01N



NOTES:

1. MAX COMPONENT HEIGHT - .58" ABOVE PCB
2. R201 - 240 INSTALLED IN TEST
3. USE REV P ARTWORK

CONTROLS

R 48 LOW SWEEP WIDTH
R 52 LOW CENTER FREQ
R 83 HORIZ CENTER
R 95 HIGH SWEEP WIDTH
R 103 HIGH CENTER FREQ
R 138 LOW FILTER ADJ

ITM	PART NO	DESCRIPTION
REQD PER ASSY		LIST OF MATERIALS

	NAME	DATE
DR		5/9/80
CHK		
ENGR		5/9/80

TOLERANCES
FRACT ± 1/64
.XX ± .01
.XXX ± .005

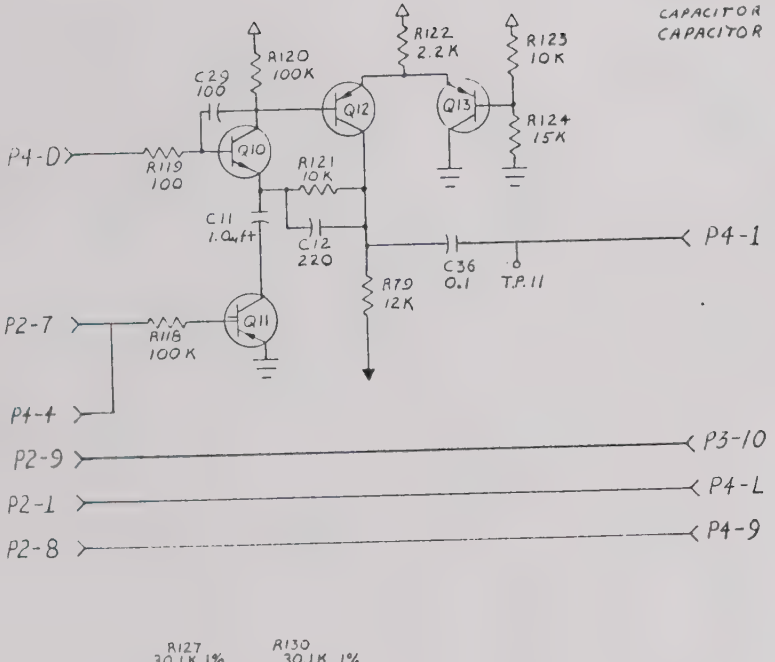
BERKELEY INDUSTRIES INC.

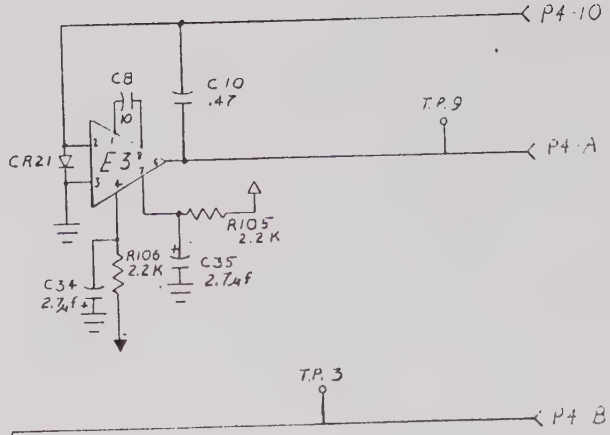
AJ	ITEM 59 CHANGED ECN 5486	8-22
AH	ECN # 08057 CTC	8/8/80
LET	REVISION	DATE

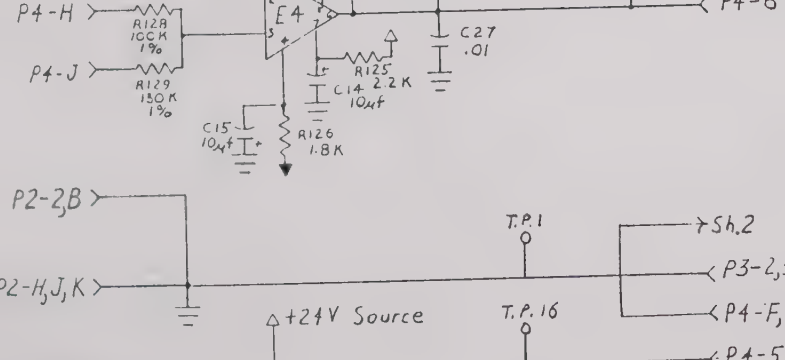
TITLE ASSY, LATERAL BOARD MODEL 1205A

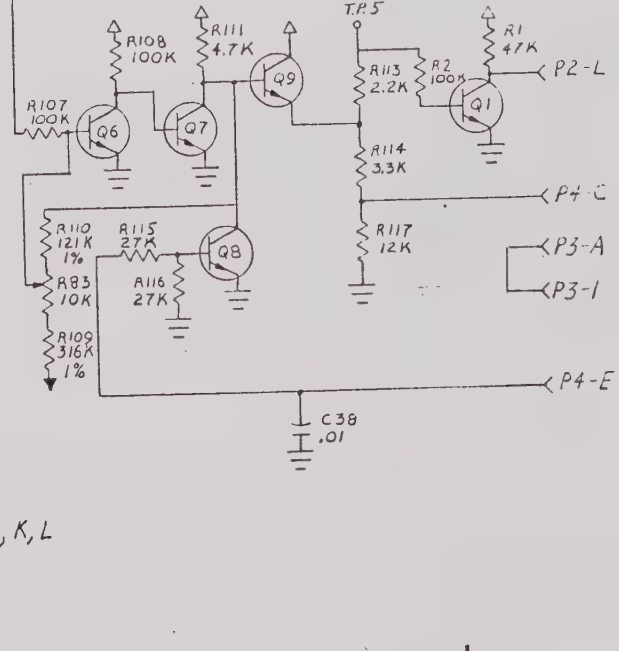
SH 1 OF 3 | SIZE | DWG NO | REV

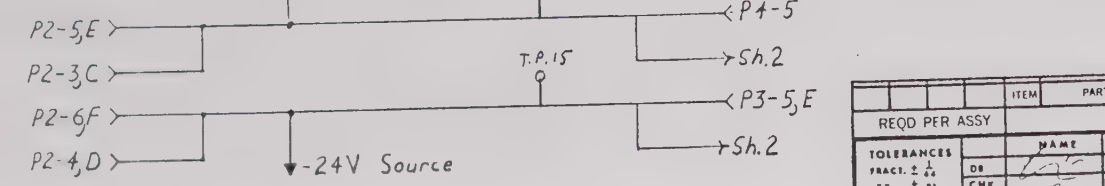
UNLESS NOTED OTHERWISE:
RESISTOR VALUES IN OHMS - K = x1000
CAPACITOR VALUES ≤ 1 IN μF
CAPACITOR VALUES ≥ 1 IN pF











ITEM	PART NO	DESCRIPTION
REQD PER ASSY		LIST OF MATERIALS

	NAME	DATE
DR		
CHK		
ENGR		8/11/82
APVD		

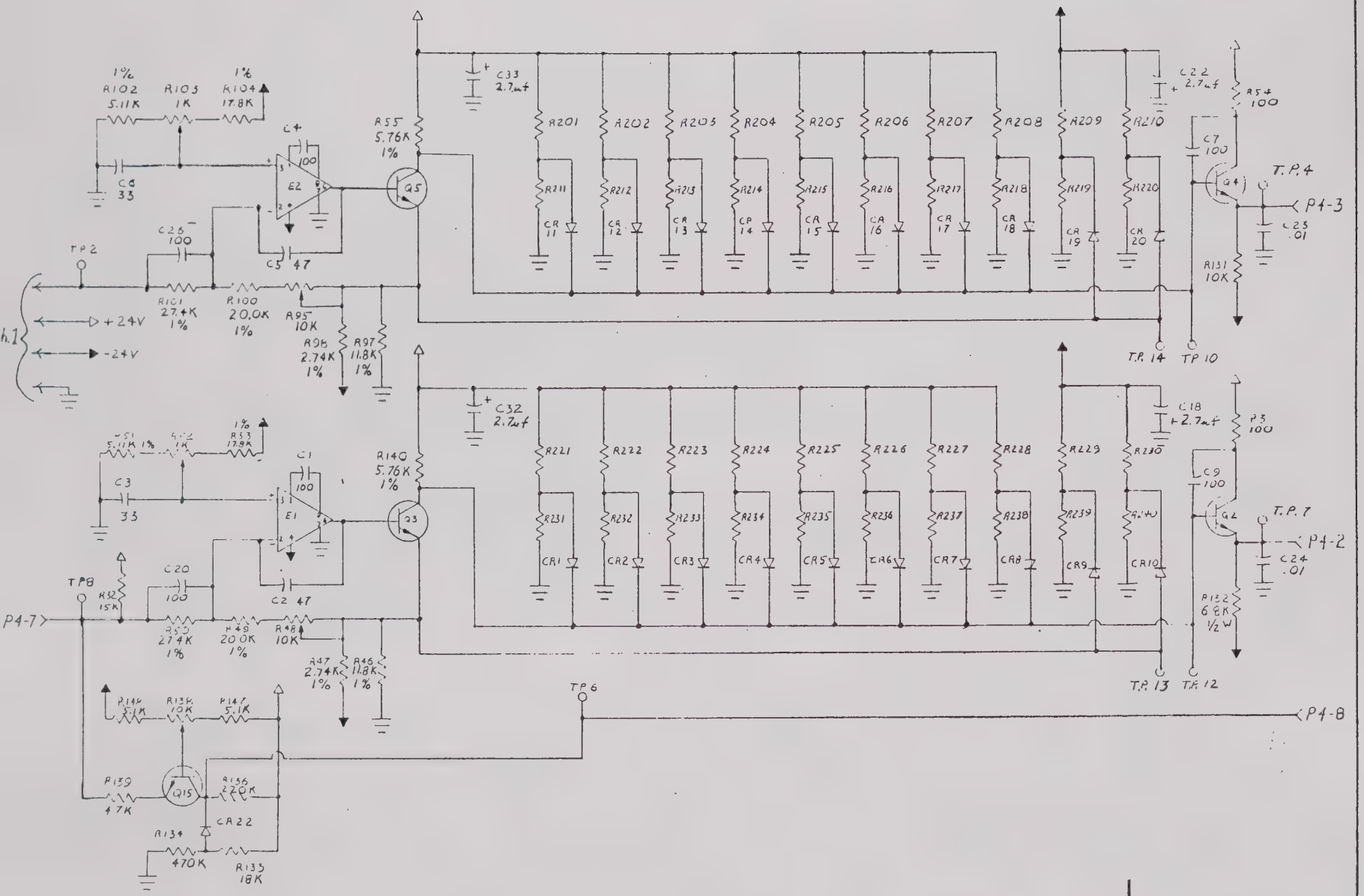
TOLERANCES
FRACT. ± 1/64
.XX ± .01
.XXX ± .005
ANG. ± 1°

BERKELEY INDUSTRIES INC.
2021 Laguna Canyon Road • Box 277
Laguna Beach, California 92652

LET	REVISION	DATE

TITLE: SCHEMATIC, LATERAL BOARD, MODEL 1205

SH 1 OF 2	SIZE C	DWG NO 54-0269-01	REV W



ITEM	PART NO.	DESCRIPTION
REQD PER ASSY		LIST OF MATERIALS

W ECN # 02057 CTC 2-11

LET	REVISION	DATE

TOLERANCES: FRACT. ± 1/64 · .XX ± .01 · .XXX ± .005 · ANG. ± 1°

	NAME	DATE
DR		5/5/82
CHK		
ENGR		5/11/82
APVD		

BERKELEY INDUSTRIES INC.
7025 Laguna Canyon Road • Box 277
Laguna Beach California 92652

TITLE: SCHEMATIC, LATERAL B.D. MODEL 1205A

SH 2 OF 2	SIZE	DWG NO	REV
REL	C	54-0269-01	W

15 R22 SHOWN DASHED FOR CLARITY ONLY. FOLD FLAT OVER CIRCUIT TOPSIDE.
2 TURNS #26 AWG. BUSS, ITEM 29 ON 1/8" ARBOR.
DO NOT SOLDER THIS POINT. TECHNICIANS WILL ADJUST LEAD LENGTH, THEN SOLDER.
C31
C28
C27
C30
C29
1"TYP
.02 MAX
C1
DETAIL B
Solder C1 case to PCB. Imaginary line thru C-E MUST be parallel to end of PCB.
Before Bending
After Bending
Cut E & B.150" long, cut C flus
Bend E 90° .100 from case
Bend B 90° .050 from case
SEE DETAIL A
12 TURNS
TIGHTLY WOUND
USE APPROX. 3/4 OF MYLAR TAPE AS GROUND PLANE.
DETAIL A
(SEE NOTE #7)
0209-02A

NOTES:
1. SHIELDS MUST BE PERPENDICULAR TO PCB AND PUSHED DOWN FULLY INTO SLOTS BEFORE SOLDERING.
2. SOLDER SHIELD TO PCB AT ALL APPLICABLE INTERSECTIONS, .100 MAX OVERFLOW.
3. 29L14 IS 1.00 LONG.
4. USE ITEM #2 ON LEADLESS DISKS ONLY.
5. SOLDER ITEM 37L1 NEAR TOP OF SHIELD, KEEP AWAY FROM PCB.
6. LEADS OF Q2 & Q3 MUST BE PARALLEL TO THE PCB.
7. ALL CIRCUITRY SHOWN IS ON FAR SIDE OF PCB.
8. USE ART WORK 57-0209-02, REVISION "A".
9. SEE DETAIL C FOR TRANSISTOR LEAD PREP.

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR		
.XX ± .01	CHK		
.XXX ± .005	ENGR		
ANG. ± 1°	APVD		

TELONIC INDUSTRIES, INC.

LET	REVISION	DAT
A		
B		
C		
D		
E		
F		
G		
H		
J		
K		
L		
M		
N		
P		
R		
S		
T		
U		
V		
W		
X		

TITLE: ASSY, P.C.B. OSCILLATOR 900-1600MH
SH 1 OF 2 | SIZE B | DWG NO 95-0282-01 | A
REL

B07-6037-01

ITEM	PART NUMBER	QTY 01	QTY 02	QTY 03	DESCRIPTION	CKT REF
1	57-0476-01	1	1	1	PC Board	
2						
3	00-1070-01	AR	AR	AR	Sleeving	
4	02-7004-07	2	2	2	Screw PH #4-40 x 7/16	
5	02-7104-06	2	2	2	Screw PH #4-40 x 3/8	
6	03-0073-01	2	2	2	Spacer Sleeve	
7	03-0052-01	2	2	2	Spacer Hex #4-40 x 1/2	
8	03-1003-01	3	3	3	Lockwasher Int 3/8	
9	03-1029-01	2	2	2	Lockwasher Ext #4	
10	03-1035-01	2	2	2	Washer Flat #4	
11	03-1502-01	3	3	3	Nut Hex 3/8-32	
12						
13	09-0366-01	8	8	8	Key	
14	09-0489-01	1	1	1	Plate Pot Mounting	
15	09-1504-01	1	1	1	Terminal	
16						
17						
18	20-0064-02	2	2	3	CFTA 4.7µF 25V	C2,3,(10)
19	20-0064-06	2	2	2	CFTA 2.7µF 35V	C1,4
20						
21	22-0055-01	2	2	2	CFD .01µF	C5,6
22	22-0202-01	1	1	1	CFD .1µF	C8
23	22-0005-01	1	1	1	CFD .001µF	C9
24						
25						
26	26-1575-01	1	1	1	RFC 150Ω 1/4W 5%	R1
27	26-1504-01	1	1	1	RFC 27K	R2
28	26-1513-01	4	4	4	RFC 10K	R8,27,28,29
29						
30						
31	26-1505-01	2	2	2	RFC 22K	R7,26
32	26-1567-01	1	1	1	RFC 270K	R9
33	26-1570-01	1	1	1	RFC 2.7K	R10
34	26-4047-05	1	1	1	RFC 47Ω	R13
35	26-1609-01	1	1	1	RFC 1.8K	R14
36	27-0253-04	2	2	2	RFMF 6.81K 1%	R18,21
37						
38	26-1527-01			1	RFC 2.2K	(R49)
39	26-1560-01	2	2	2	RFC 270Ω	R37,38
40						
41						
42	26-1608-02	1	1	2	RFC 3.9K	R46(47)
43						
44	29-0155-04	1	1	1	RVC 10K Log Taper	R4
45	29-0154-05	1	1	1	RVC 5K	R11
46	29-0154-06	9	9	10	RVC 10K	R15,17,30-36,(4
47	29-0162-01	1			RVC 10K/10K Dual Concentric	R43A,B
48	29-0155-02		1	1	RVC 10K	R43
49	29-0154-04	2	2	2	RVC 1K	R42,44
50	29-0174-01	1	1	1	RVC 10K	R19
51						
52	32-0038-01	1	1	1	IF 1000µH	L1
53						
54	37-0107-01	7	7	7	SWT SPDT	S1-7
55	37-0180-01	1	1	1	SWR 4P5T w/dual 10K RVC	S8,R12A,B
56	37-0181-01	1	1	1	SWR SPDT w/10K RVC	S9,R39
57	37-0169-01			1	SWS 4 pole - 3 position	S10
58						
59	41-0118-01	1	1	1	DS Light Emitting Red	LED
60						

	BY	NAME	DATE
APVD			
ENG			
CHK		TPR	5/5/77

Retyped for clarity only

5/6/77

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494-9401 • TWX 910 596-1320

PARTS LIST

TITLE: ASSY, PCB FRONT PANEL, 1200A Series

REEL: SH 4 OF 7

SIZE: A

DWG NO: 95-0476-( )

REV: Z

ITEM	PART NUMBER	QTY 01 02 03	DESCRIPTION	CKT REF
61	43-0043-01	AR AR AR	Wire Buds 22 ga.	
62				
63				
64	44-0102-01	4 4 4	Connector, PCB	J3-6
65				
66				
67	96-5541-01	1 1 1	Vernier (Modified)	F/F 09-4579-01
68				
69				
70				
71				
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119				
120				

BY	NAME	DATE
CHK		
ENG	Retyped TPR for clarity only	5/5/77

telonic

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel. 714 494-9401 • TWX 910 596-1320

PARTS LIST

TITLE: ASSY, PCB FRONT PANEL, 1200A Series

SIZE: A | DWG NO: 95-0476-( ) | REV: E

SH 5 OF 7

95-0476-( )

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0269-01	1	PC Board	
2				
3	00-1070-01	A/R	Sleeving	
4				
5	09-1504-01	16	Terminal Test Point	
6				
7	20-0030-01	2	CFTA 10µF/25V	C14,15
8				
9	20-0064-06	6	CFTA 2.7µF/35V	C18,19,21,22,32-35
10				
11	20-0082-01	1	CFTA 1µF	C11
12				
13				
14	22-0001-06	1	CFD 10pF	C8
15	22-0002-01	2	CFD 33pF	C3,6
16				
17				
18	22-0038-01	8	CFD 100pF	C1,4,7,9,13,20,26,29
19				
20	22-0055-01	4	CFD .01µF	C23,24,27,38
21				
22	22-0123-01	1	CFD 220pF	C12
23	22-0170-01	1	CFD .1µF	C36
24	22-0195-01	1	CFMY 0.47µF	C10
25	22-0002-05	2	CFD 47pF	C 2,5
26				
27	26-0109-01	1	RFC 6.8K ±10% 1/2W	R132
28				
29				
30				
31				
32	26-1522-01	3	RFC 100Ω ±10% 1/4W	R3,54,119
33	26-1524-01	1	RFC 47K ±10% 1/4W	R1
34	26-1514-01	5	RFC 100K ±5% 1/4W	R2,108,118,120,107
35				
36	26-1527-01	5	RFC 2.2K ±10% 1/4W	R105,106,113,122,125
37				
38				
39	26-1529-01	2	RFC 27K ±10% 1/4W	R115,116
40				
41	26-1531-01	2	RFC 4.7K ±10% 1/4W	111,139
42				
43	26-1532-01	2	RFC 12K ±10% 1/4W	R79,117
44				
45	26-1533-01	1	RFC 18K ±10% 1/4W	R133
46	26-1535-01	2	RFC 15K ±10% 1/4W	R32,124
47				
48	26-1536-01	1	RFC 220K ±10% 1/4W	R136
49	26-1541-01	1	RFC 470K ±10% 1/4W	R134
50	26-1568-01	1	RFC 1.8K ±10% 1/4W	R126
51				
52				
53	26-1594-01	3	RFC 10K ±10% 1/4W	R121,123,131
54				
55				
56	26-1596-01	1	RFC 3.3K ±10% 1/4W	R114
57	26-4251-05	2	RFC 5.1K ±5% 1/4W	R147,148
58	27-0253-08	1	RFMF 100K 1%	R128
59	27-5151-30	1	RFMF 130K 1%	R129
60	27-5135-76	2	RFMF 5.76K 1%	R55,140

ENG: CHK: BY: TPR retyped — NAME — DATE: 3/14/77

3/25/77

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road · Box 277
Laguna Beach, California 92652
Tel 714 494-9401 · TWX 910 596-1320

PARTS LIST

TITLE: ASSEMBLY SIDE BOARD

REEL: SH 2 OF 3

SIZE: A

DWG NO: 95-0269-01

REV: AH

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
61	27-0253-21	1	RFMF 316K ±1% 1/4W	R109
62	27-0253-71	2	RFMF 30.1K ±1% 1/4W	R127,130
63	27-0253-93	1	RFMF 121K ±1% 1/4W	R110
64	27-0253-07	2	RFMF 27.4K 1%	R50,101
65	27-0253-70	2	RFMF 20.0K 1%	R49,100
66	27-5141-78	2	RFMF 17.8K 1%	R53,104
67	27-5000-00	A/R	RFMF FSV	
68	27-0253-79	2	RFMF 11.8K 1%	R46,97
69	27-0253-91	2	RFMF 2.74K 1%	R47,98
70	27-5135-11	2	RFMF 5.11K 1%	R51,102
71				
72				
73				
74				
75				
76				
77	29-0173-07	2	RVC 1K	R52,103
78	29-0173-10	4	RVC 10K	R48,83,95,138
79				
80	40-0041-01	6	TR 2N3904	Q2-5,9,15
81				
82	40-0042-01	1	TR 2N3906	Q11
83	40-0097-01	5	TR MPSA10	Q1,6-8,10
84	40-0101-01	2	TR 2N5138	Q12,13
85				
86				
87	41-0053-01	22	DS IN459	CR1-22
88				
89				
90	43-0043-01	A/R	Wire Buss #22 Ga.	
91				
92				
93	45-0020-01	4	ICL µA748C	E1-4
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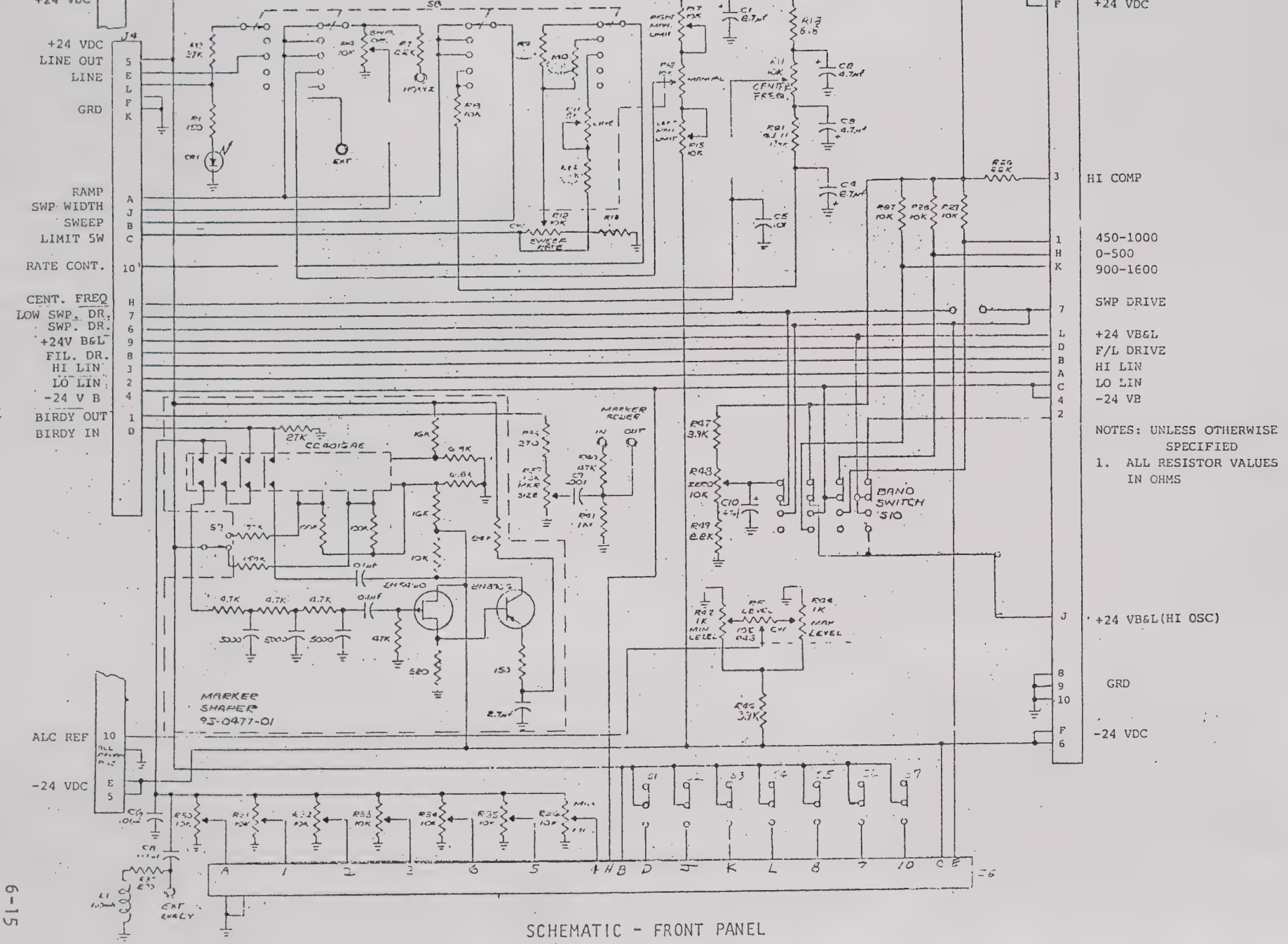
	BY	NAME	DATE
APVD			
ENG			
CHK	TPR	retyped	3/14/77

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494-9401 • TWX 910 596-1320

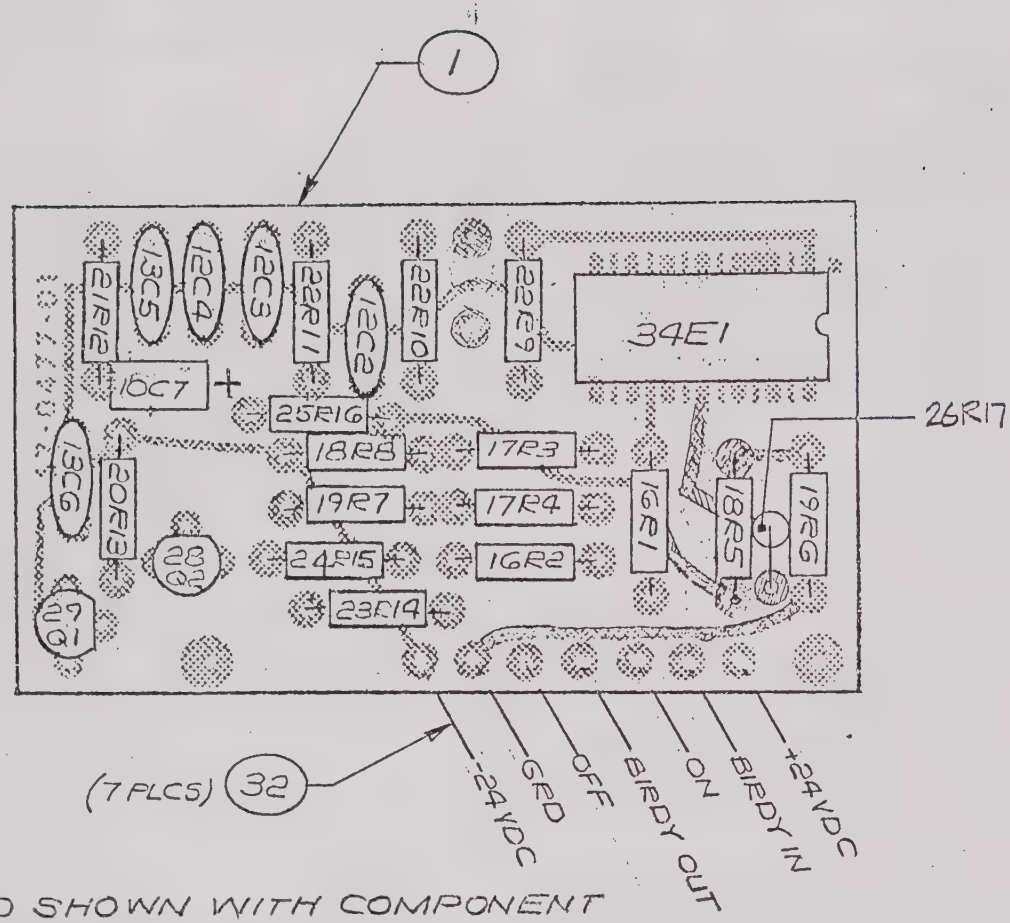
PARTS LIST

TITLE: ASSEMBLY SIDE BOARD

REL	SIZE	DWG NO	REV
SH 3 OF 3	A	95-0269-01	AH



SCHEMATIC - FRONT PANEL



NOTES:

1. BOARD SHOWN WITH COMPONENT SIDE CIRCUITRY UP.
2. ITEMS 32 TO BE INSTALLED FROM FAR SIDE.

LET	REVISION	DATE
E	90047 P. Gc	3/23/79
D	ECN 9565 L.W.	9-9-77
C	ECN 8782	11/13/75
B	ECN 8157 ADD NOTE 2 KW	5-23-75
A	ECN 8026 ITEM 10 WAS 20-0014-05	1-31-75

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	K. Wesley	5/31/74
.XX ±.01	CHK		
.XXX ±.005	ENGR	RL Kiner	5/31/74
ANG. ± 1°	APVD	[illegible]	5/23/74

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TITLE ASSY, PCB MARKER SHAPER

SH 1 OF 2	SIZE	DWG NO	REV
REL	A	95-0477-01	E

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0477-01	1	P.C. Board	
2				
3				
4				
5				
6				
7				
8				
9				
10	20-0064-06	1	CFTA 2.7µF 35V	C7
11				
12	22-0011-01	3	CFD 5000µF	C2-4
13	22-0202-01	2	CFD 0.1µF	C5,6
14				
15				
16	26-1546-01	2	RFC 150K 1/4W 5%	R1,2
17	26-1514-01	2	RFC 100K	R3,4
18	26-4316-05	2	RFC 16K	R5,8
19	26-1544-01	2	RFC 6.8K	R6,7
20	26-1513-01	1	RFC 10K	R13
21	26-1507-01	1	RFC 47K	R12
22	26-1548-01	3	RFC 4.7K	R9,10,11
23	26-1523-01	1	RFC 220Ω	R14
24	26-1575-01	1	RFC 150Ω	R15
25	26-4324-05	1	RFC 24K	R16
26	26-1504-01	1	RFC 27K	R17
27				
28	40-0042-01	1	TR 2N3906	Q2
29	40-0096-01	1	TRFE 2N5460	Q1
30				
31				
32	43-0043-01	4"	Wire Buss 22 ga.	
33				
34	45-0029-01	1	ICD CD4016AE	E1
35				
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ENG: RLKiage | CHK: | BY: TPR | NAME | DATE: 6/3/74 | 6-6-74

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel: 714 494-9401 • TWX: 910 596-1320

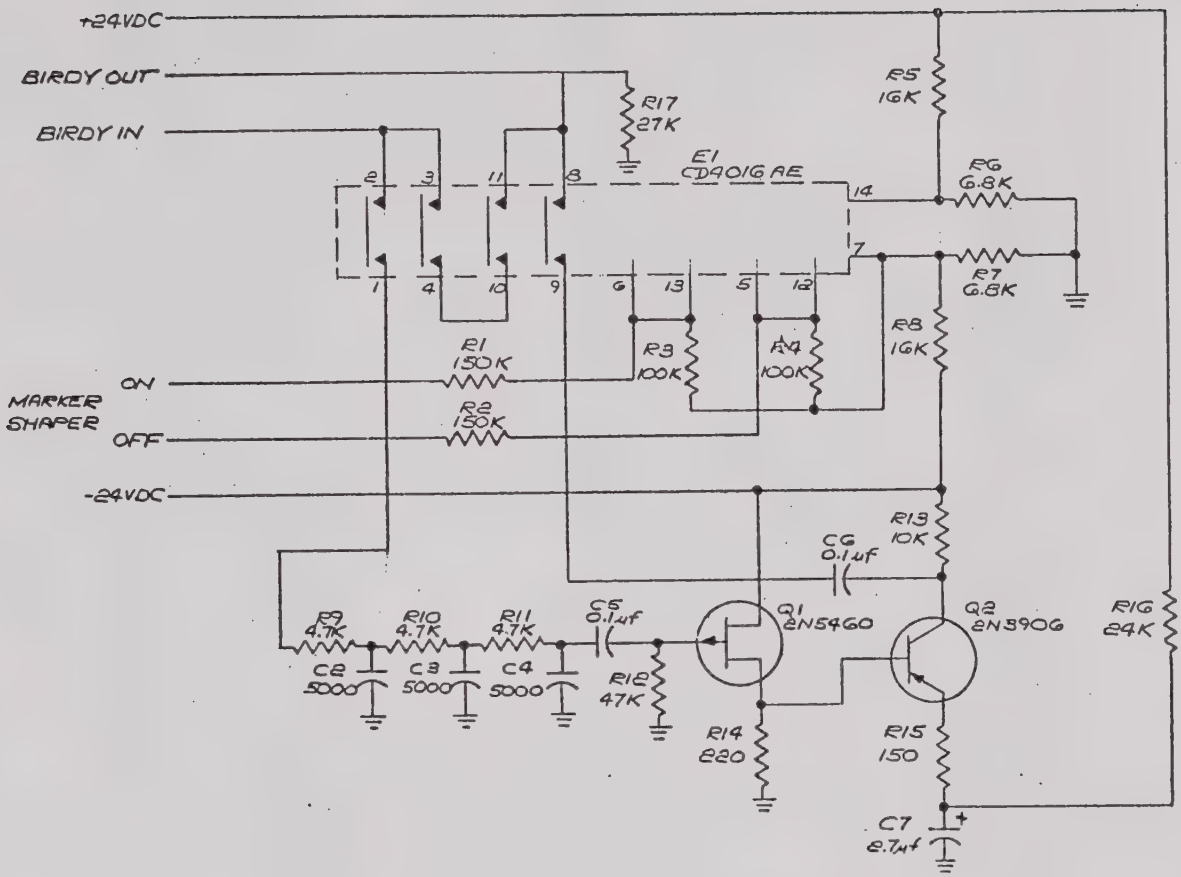
PARTS LIST

TITLE: ASSY, P.C.B MARKER SHAPER

REL | SH 2 OF 2

SIZE: A | DWG NO: 95-0477-01 | REV: F

6-17



NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES IN OHMS

SCHEMATIC - MARKER SHAPER
B54-0477-01B

H-6320
K-6548
L-6595
M-6716
MZ-6631
P-6810
RT-7112
RT-7134

ITEM	PART NUMBER	QTY -01/-	DESCRIPTION	CKT REF
1	57-0209-02	1	P.C.Board	PCB1
2	01-0403-03	AR	Solder,2% Silver	See Sh.1,Note 4
3	03-0194-01	2	Washer, Mica	
4	03-1028-01	2	Lockwasher,#4,Spring	
5	03-1523-01	2	Hex Nut, #4-40	
6				
7	A15-9008-01	1	Shield	
8	A15-9007-01	2	Shield	
9				
10	21-0009-01	1	CF, Solder-In,470pF	C9
11	A21-0038-01	1	CF,Solder-In,20pF	C3
12	21-0045-01	1	CF,Solder-In,100pF	C17
13	21-0046-01	8	CFCF,120pF,Hollow	C2,4,5,7,8,10,12,1
14	B21-0020-01	1	CFCF,120pF	C15
15	25-0016-01	1	RVV	R22
16	27-0253-09	1	RFMF,2.1k,±1%,1/4W	R15
17				
18	26-1530-01	1	RFC,47Ω,±10%,1/4W	R18
19	26-3001-01	2	RFC,1k,±10%,1/8W	R2,19
20	27-0253-02	1	RFMF,1.21k,±1%,1/4W	R9
21	26-3007-01	2	RFC,10Ω,±10%,1/8W	R7,11
22	26-3014-01	3	RFC,220Ω,±10%,1/8W	R10,17,14
23	27-0105-01	1	RFMF,1.3k,±1%,1/4W	R4
24	27-0266-01	1	RFMF,432Ω, 1W	R1
25	27-0253-90	1	RFMF,4.02k,±1%,1/4W	R3
26	27-0253-91	2	RFMF,2.74k,±1%,1/4W	R8,16
27	27-0250-96	1	RFMF,154Ω,±1%,1/2W	R12
28	32-0040-01	3	IF,.47uH	L3,6,7
29	43-0075-01	AR	Wire,Buss #26 AWG	
30	40-0092-01	1	TR,MT 1060	Q1
31	43-0043-01	AR	Wire, Buss 22 Ga.	
32	41-0022-01	2	DS,1N3064	CR4,5
33	41-0112-01	2	DSV,BB105B	CR1,2
34	41-0115-01	1	DS,HPA 5082-3080	CR3
35	43-0091-14	AR	IF,12 Turn #36Ga.	L15
36	A97-9494-03A	2	TR Assembly	Q2,3
37	32-0027-01	1	IF, 1.0uh	L1
38				
39				
40	63-1633-08	AR	Mylar Tape	
41				
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	NAME	DATE
BY	TPR	4/3/72
CHK		
ENG		
APVD		

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TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494-9401 • TWX 910 596-1320

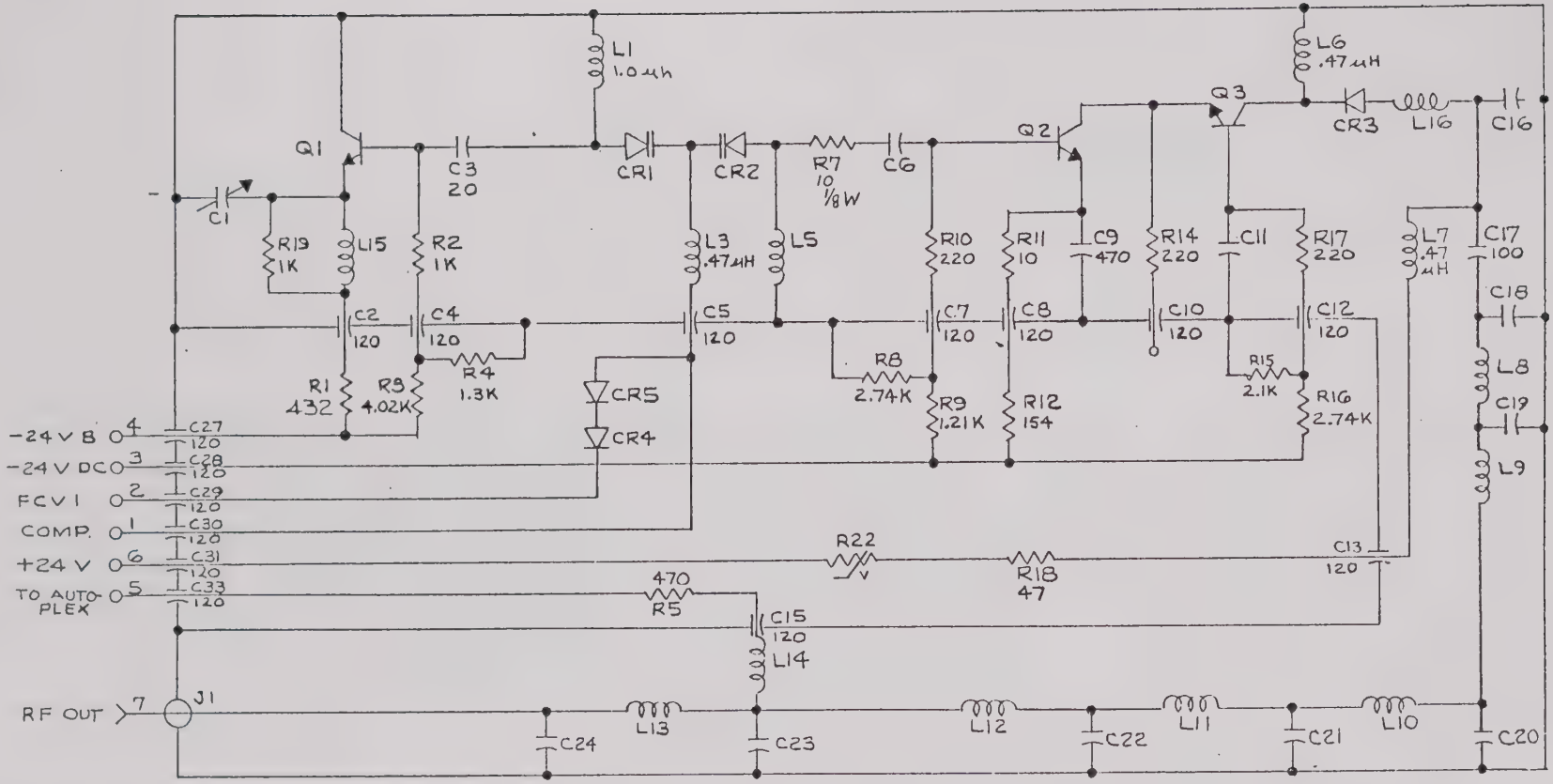
PARTS LIST

TITLE ASSEMBLY,P.C.B.,OSCILLATOR, 900-1600 MHz

SIZE A | DWG NO 95-0282-( ) | REV AG

SH 2 OF 2 | REL

C-20

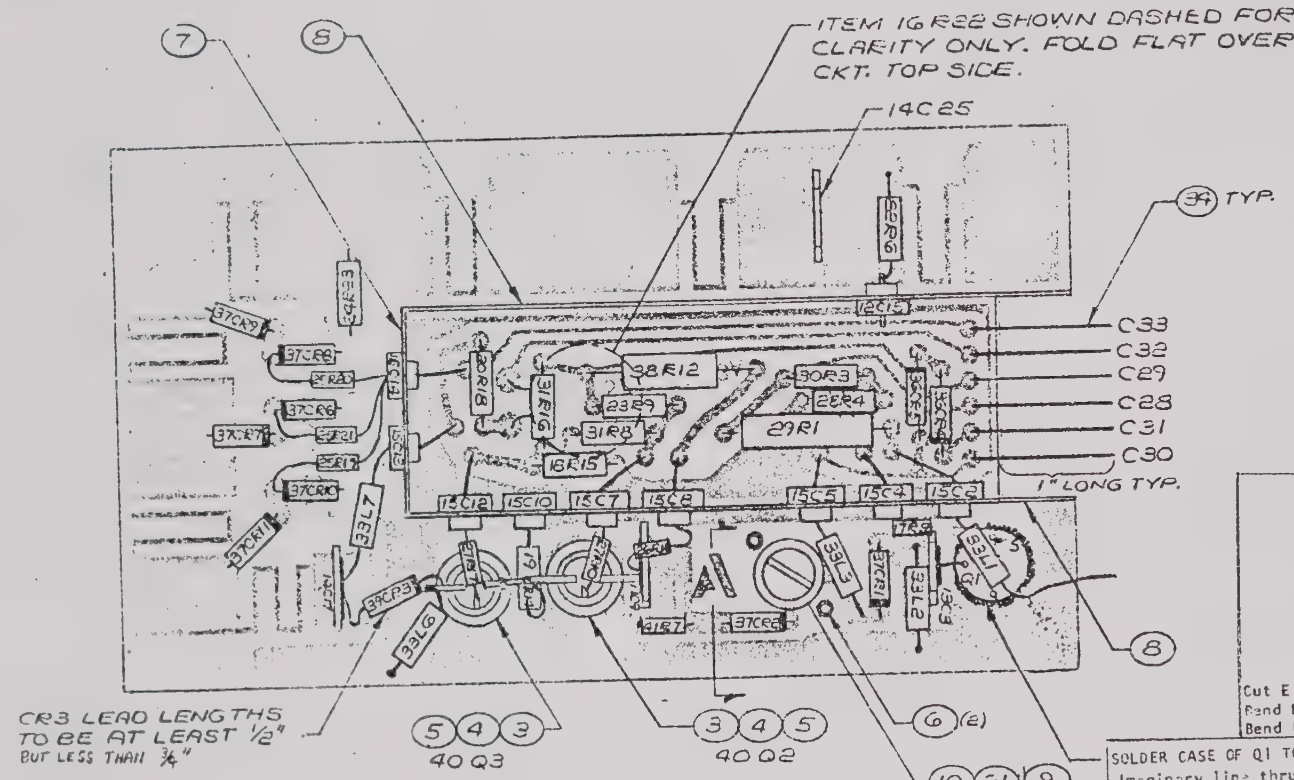


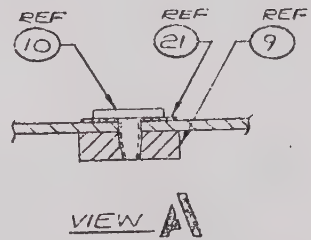
950-1600 MHz OSC.

SCHEMATIC B54-0281-01
ASSEMBLY 95-0281-01

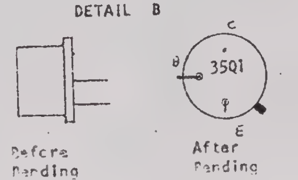
NOTES: UNLESS OTHERWISE SPECIFIED
1. CAPACITOR VALUES IN PICOFARADS.
2. RESISTOR VALUES IN OHMS.

SCHEMATIC: 900-1600 MHz OSCILLATOR
B54-0281-01J





DETAIL B



Cut E & B .150' long, cut C flush
Bend E 90° .100" from case
Bend B 90° .050" from case

SOLDER CASE OF Q1 TO PCB
Imaginary line thru C-E
MUST be parallel to
End of PCB

NOTES:

1.— SHELDS MUST BE PERPENDICULAR TO PCB AND PUSHED DOWN FULLY INTO SLOTS BEFORE SOLDERING.
2.— SOLDER SHIELD TO PCB AT ALL APPLICABLE INTERSECTIONS, .100 MAX OVERFLOW.
3.— USE ITEM #2 ON LEADLESS DISKS ONLY
4.— SEE SCHEMATIC Nº 54-0279-01
5. SEE DETAIL "B" FOR TRANSISTOR LEAD PREP

LET	REVISION	DATE
X	SHT 2 OF 2 REDRAWN	6/2/82
W	[illegible]	[illegible]
V	ECN 9455	[illegible]
U	ECN 9339	[illegible]
T	CHG'D ITEM 2 FROM -01 TO -03 E.C.N 9274	[illegible]
S	[illegible]	[illegible]
R	[illegible]	[illegible]
Q	[illegible]	[illegible]
P	ECN 8688 REDRAWN [illegible]	[illegible]

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	S.M.	6/5/71
.XX ± .01	CHK	M.R.B.	6/6/71
.XXX ± .005	ENGR	[illegible]	[illegible]
ANG. ± 1°	APVD	[illegible]	[illegible]

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel 714 494 9401 • TWX 910 596-1320

TITLE ASSEMBLY, P.C.B., 450-1000 MHz OSCILLATOR(?)

SH 1 OF 2 | SIZE B | DWG NO 95-0260-01(?) | REV X

REL

A-5413
B-5458
C-5608
D-5647

J-7001
LSI only
M-7123

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0171-03	1	P.C. Board	PCB-1
2	01-0403-03	A/R	Solder, 2% Silver	See sht.1,note 3
3	03-0194-01	2	Washer, Mica	
4	03-1033-01	2	Lockwasher, #4, Spring	
5	03-1523-01	2	Nut, Hex, #4-40	
6	09-0064-01	2	Eyelet, .059 dia. x 7/32	
7	A15-9008-01	1	Shield	
8	A15-9007-01	2	Shield	
9	14-9023-01	1	Block, Nylon	
10	02-9000-01	1	Screw, Adjust	
11	21-0009-01	1	CFD, 470 pF, solder-in	C9
12	B21-0020-01	1	CFCF, 120 pF	C15
13	A21-0038-01	1	CFD, 20 pF, solder-in	C3
14	21-0045-01	2	CFD, 100 pF, solder-in	C17,25
15	21-0046-01	9	CFCF, 120 pF, hollow	C2,4,5,7,8,10,12-1
16	25-0016-01	1	RVV	R22
17	26-3001-01	1	RFC, 1kΩ, ±10%, 1/8W	R2
18	27-0253-09	1	RFMF, 2.1kΩ, ±1%, 1/4W	R15
19	26-1501-01	1	RFC, 220Ω, ±10%, 1/4W	R14
20	26-1530-01	1	RFC, 47Ω, ±10%, 1/4W	R18
21	03-0195-01	1	Washer, Teflon	
22	26-1528-01	1	RFC, 1kΩ, ±10%, 1/4W	R6
23	27-0253-02	1	RFMF, 1.21kΩ, ±1%, 1/4W	R9
24	26-1594-01	1	RFC, 10kΩ, ±10%, 1/4W	R23
25	26-3002-01	3	RFC, 10kΩ, ±10%, 1/8W	R19-21
26	26-3007-01	1	RFC, 10Ω, ±10%, 1/8W	R11
27	26-3014-01	2	RFC, 220Ω, ±10%, 1/8W	R10,17
28	27-0105-01	1	RFMF, 1.3kΩ, ±1%, 1/4W	R4
29	27-0266-01	1	RFMF, 432Ω, ±1%, 1W	R1
30	27-0253-90	1	RFMF, 4.02kΩ, ±1%, 1/4W	R3
31	27-0253-91	2	RFMF, 2.74kΩ, ±1%, 1/4W	R8,16
32	00-1070-01	A/R	Tubing, Teflon	
33	32-0040-01	5	IF, .47 µH	L1-3,6,7
34	43-0043-01	A/R	Wire, #22 Buss	L4
35	A40-0085-01	1	TR, A210	Q1
36	41-0022-01	2	DS, IN 3064	CR4,5
37	41-0112-01	8	DSV, Siemens BB105B	CR1,2,6-11
38	27-0250-96	1	RFMF, 154Ω, ±1%, 1/2W	R12
39	41-0115-01	1	DS, HPA 5082-3080	CR3
40	A97-9494-03	2	Assembly, Transistor	Q2,3
41	26-3006-01	1	RFC, 22Ω, ±10%, 1/8W	R7
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CHK
BY
KH
NAME
9/14/71
DATE

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652

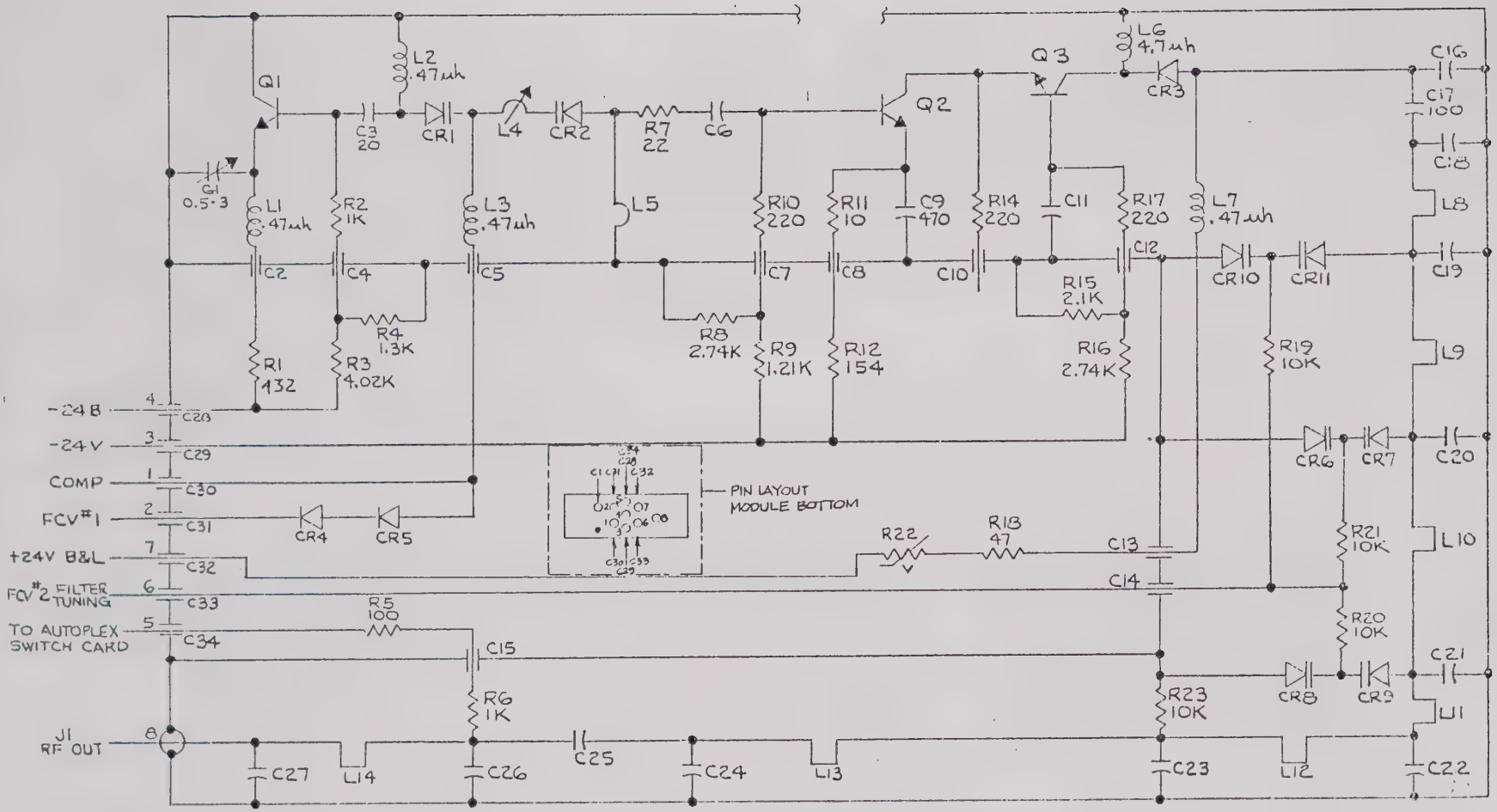
PARTS LIST

TITLE ASSEMBLY, PCB, OSCILLATOR, 450-1000 MHz

SH 2 OF 2
SIZE
DWG NO
REV

95-0280-01

6-23

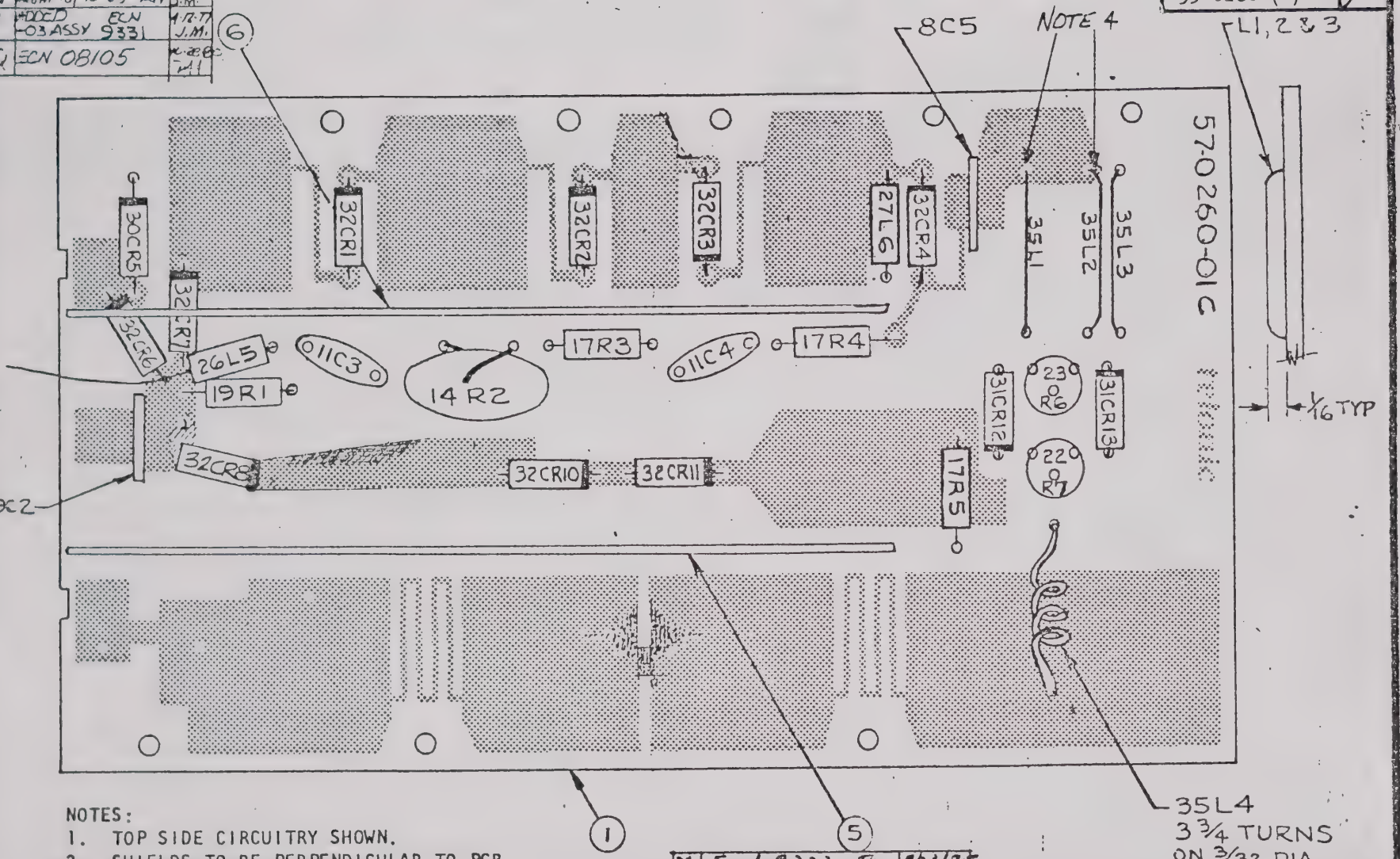


NOTES: UNLESS OTHERWISE SPECIFIED
1. CAPACITORS IN MICROFARADS.
2. FEED THRU CAPACITORS ARE 120 uf.
3. RESISTORS IN OHMS,
4. FOR ASSEMBLY SEE 95-0279-01.

SCHEMATIC - 450-1000 MHz OSCILLATOR

B54-0279-01B

P	ADDED -03 ASSY 9331 ECN	J.M.	
Q	ECN 08105	-M1	



NOTES:
1. TOP SIDE CIRCUITRY SHOWN.
2. SHIELDS TO BE PERPENDICULAR TO PCB.
3. USE ITEM 2 TO INSTALL ITEMS 5,6,8,9.
4. Solder L1 and L2 to both sides of PCB.

M	ECN 8222	9/21/73	H	ECN 7930 Chg -02	11/73
L	ECN 8726	3-5-75	G	REDRAWN PER ECN # 7378	8/20/73
K	ADDED NOTES ECN 7520	8/24/74	LET	REVISION	DATE
J	ECN 7840 (JA)	8/24/74			

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	B H PERKINS	8/20-73
.XX ±.01	CHK		
.XXX ±.005	ENGR	E. FOASBERG	8-22-73
ANG. ±1°	APVD	[illegible]	8/22/73

telonic

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel. 714 494-9401 • TWX 910 596-1320

TITLE: PCB ASSY, RF DISTRIBUTION MIXER AND COMBINER MODULE -01

SH 1 OF 4	SIZE	DWG NO	REV
REL	A	95-0260-( )	Q

ITEM	PART NUMBER	QTY 01	QTY 02	QTY 03	DESCRIPTION	CKT REF
1	57-0260-01	1	1	1	P.C. Board	
2	01-0403-03	AR	AR	AR	Solder 2% Silver	
3						
4						
5	15-9007-01	1	1	1	Shield	
6	15-9007-02	1	1	1	Shield	
7						
8	21-0045-01	1	1	1	CF Solder-in 100pF	C5
9	21-0041-01	1		1	CF Solder-in 5000pF	C2
10	22-0124-01		1		CFD 1500pF	C7
11	22-0038-01	2	2	2	CFD 100pF	C3,4
12						
13						
14	25-0016-01	1	1	1	RVV	R2
15						
16						
17	26-1501-01	3	2	3	RFC 220Ω ±10% 1/4W	R3,4,5(-02,3,4) (-03,3-5)
18						
19	26-4168-06	1		1	RFC 680Ω ±10% 1/4W	R1
20	26-4047-05		1		RFC 47Ω ±5% 1/4W	R20
21						
22	29-0131-05	1	1	1	RVC 50Ω	R7
23	29-0131-06	1	1	1	RVC 200Ω	R6
24						
25						
26	32-0021-01	1	1	1	IF 4.7μH	L5
27	32-0040-01	1	1	1	IF .47μH	L6
28						
29						
30	41-0032-01	1		1	DS 1N 100	CR5
31	41-0111-01	2	2	2	DS HPA-5082-2800	CR12,13
32	41-0115-01	9	2	7	DS HPA-5082-3080	CR1-4,6-8,10-11 (-02),CR4,11 (-03),CR1-4,6,7,11
33						
34						
35	43-0091-10	AR	AR	AR	Wire Solderable #24 Ga.	L1-4
36						
37	43-0086-01		AR	AR	Wire Buss	
38						
39						
40						
41						
42						
43						
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ENG | CHK | BY | NAME | DATE

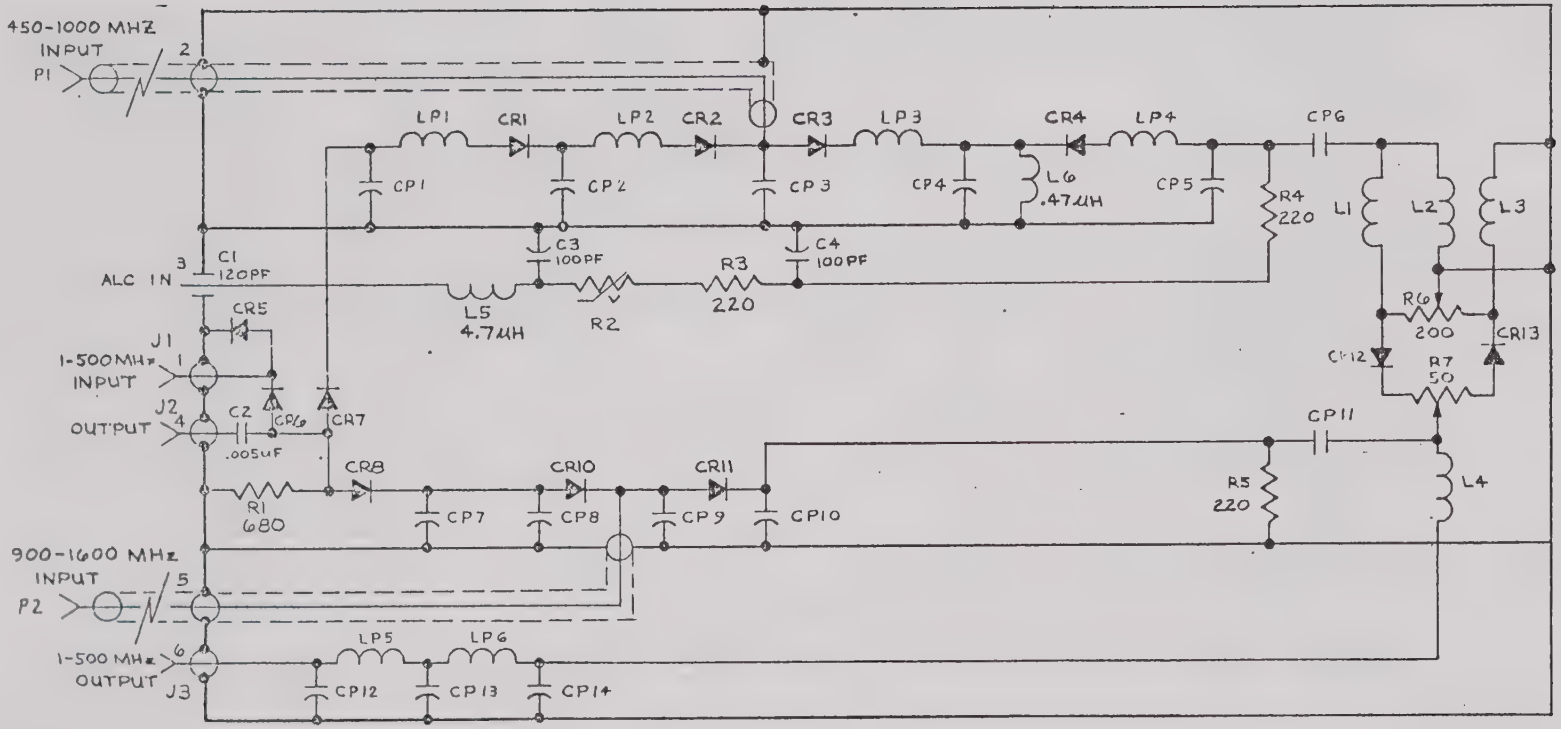
Retyped TPR | 4/12/77

TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road · Box 277
Laguna Beach, California 92652
Tel. 714/494-9401 · TWX 910/596-1370

PARTS LIST

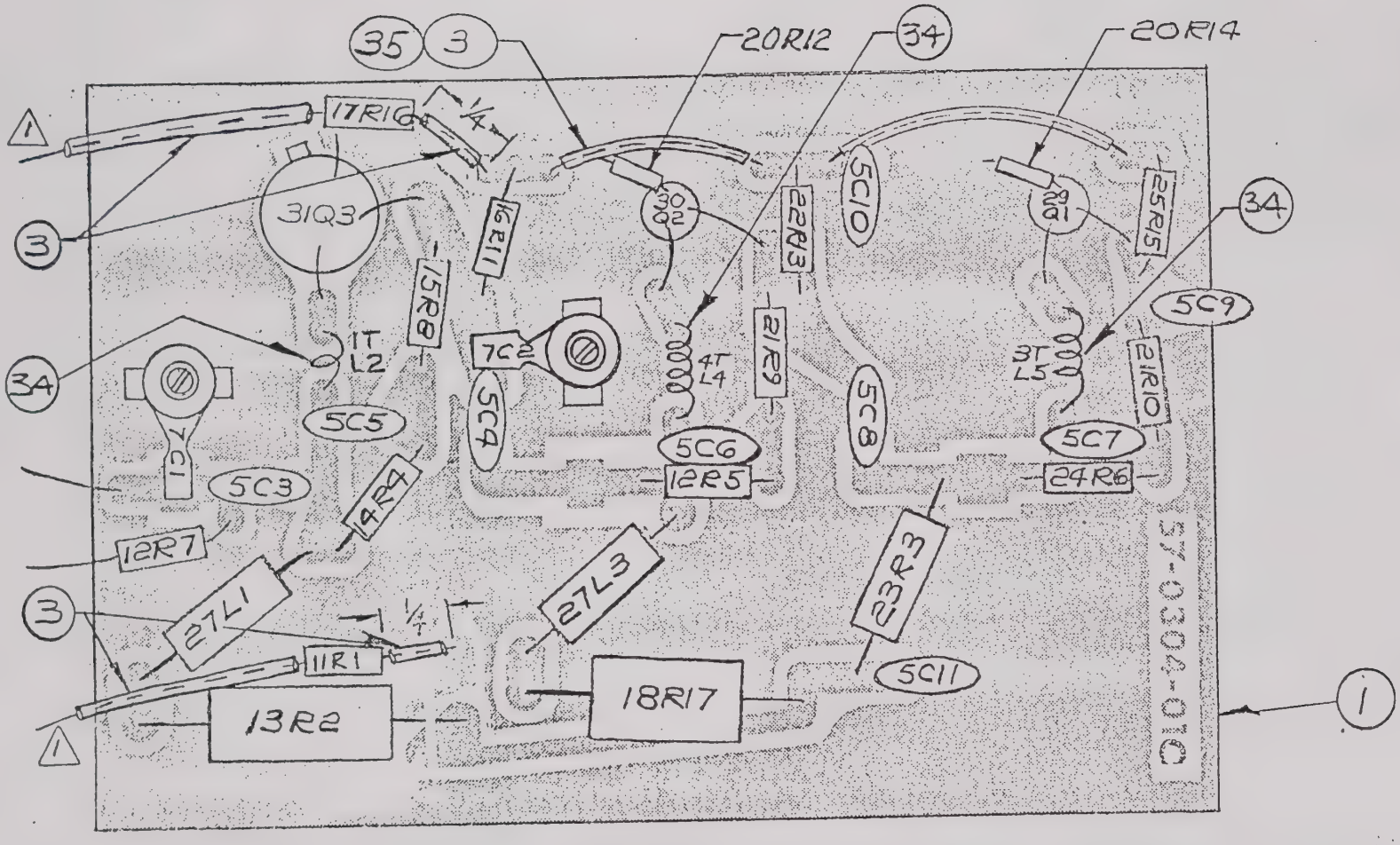
TITLE ASSY, PCB, R.F. DISTRIBUTION, MIXER & COMBINER

REL | SH 4 OF 4 | SIZE A | DWG NO 95-0260-( ) | REV



SCHEMATIC - RF DISTRIBUTION/MIXER/COMBINER

B54-0259-01A



1-500 MHz AMPLIFIER - PCB ASSEMBLY

A95-0304-01N

ITEM	PART NUMBER	QTY	DESCRIPTION	CKT REF
1	57-0304-01	1	PCB	
2				
3	00-1070-01	A/R	Sleeving	
4				
5	22-0202-01	9	CFD, 0.1μF, 50 V.	C3-11
6				
7	23-0045-02	2	CTCD, 1.7-10 pF	C1, 2
8				
9				
10				
11	26-4010-05	1	RFC, 10Ω, 1/4W, 5%	R1
12	26-1519-01	2	RFC, 1k, 1/4W, 5%	R5,7
13	28-0084-01	1	RFC, 200Ω, 2W, 5%	R2
14	26-4182-05	1	RFC, 820Ω 1/4W, 5%	R4
15	26-1559-01	1	RFC, 180Ω, 1/4W, 5%	R3
16	26-1562-01	1	RFC, 3.3k, 1/4W, 5%	R11
17	26-1572-01	1	RFC, 22Ω, 1/4W, 5%	R16
18	28-0143-01	1	RFC, 470Ω, 1W, 5%	R17
19				
20	26-3007-01	2	RFC, 10Ω, 1/8W, 10%	R12,14
21	26-1560-01	2	RFC, 270Ω, 1/4W, 5%	R9,10
22	26-1580-01	1	RFC, 5.6k, 1/4W, 5%	R13
23	26-0057-01	1	RFC, 750Ω, 1/2W, 5%	R3
24	26-1553-01	1	RFC, 2.2k, 1/4W, 5%	R6
25	26-1520-01	1	RFC, 8.2k, 1/4W, 5%	R15
26				
27	32-0019-01	2	IF, 10μH	L1,L3
28				
29	40-0108-01	1	TR A485	Q1
30	40-0084-01	1	TR A430	Q2
31	40-0068-01	1	TR 2N5109	Q3
32				
33				
34	43-0091-10	A/R	Wire, 24 ga, Solderable Magnet	L2,4,5 (Note 2)
35	43-0043-01	A/R	Buss Wire #22	
36				
37				
38				
39				
40				
41				
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BY CHK

NAME TPR

DATE 3/17/72

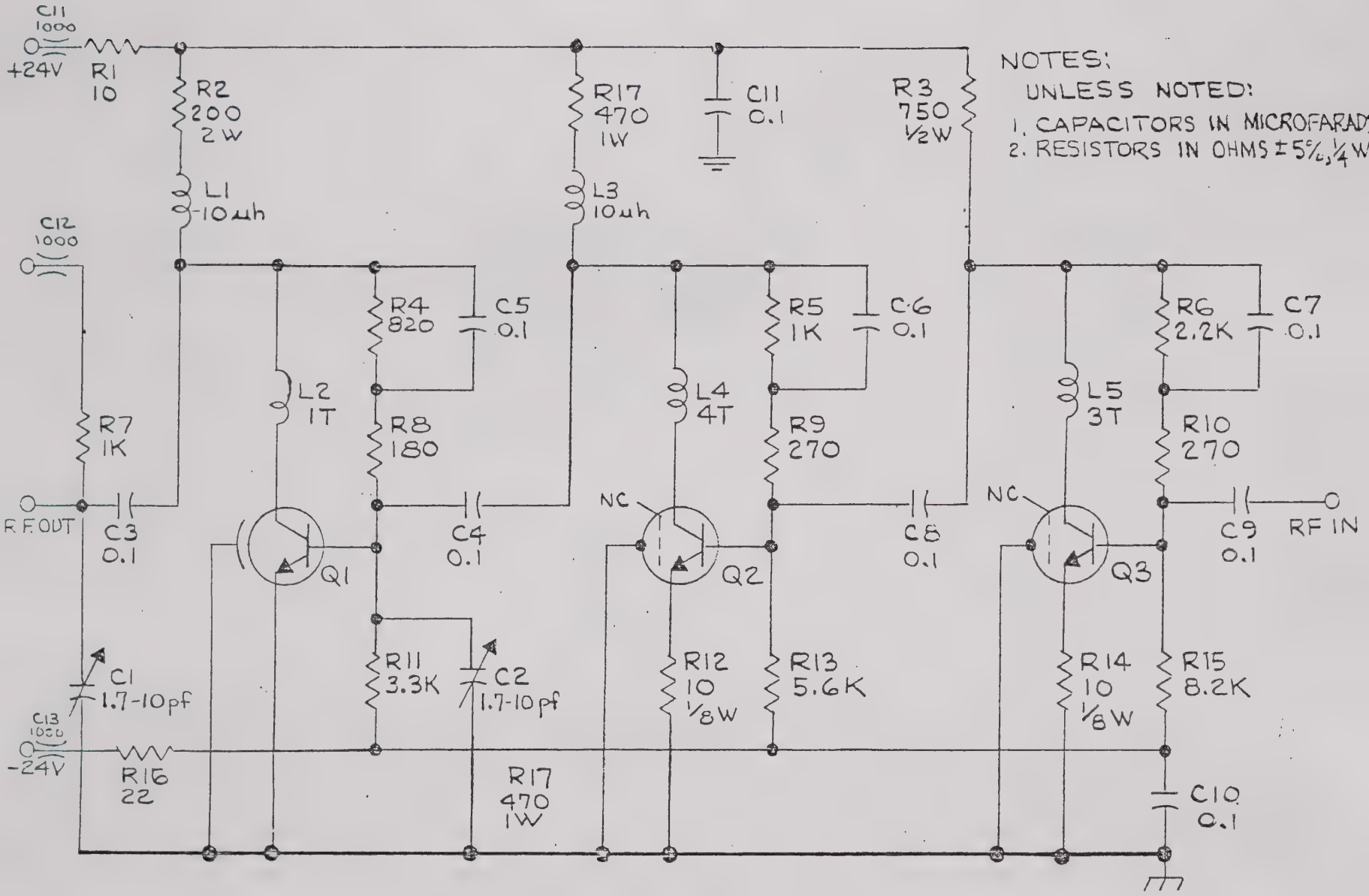
TELONIC INDUSTRIES, INC.
21282 Laguna Canyon Road • Box 277

PARTS LIST

TITLE PCB ASSY, 1-500 MHz AMPLIFIER

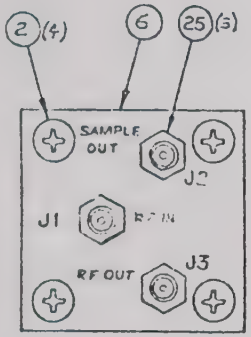
SH 2 OF 2

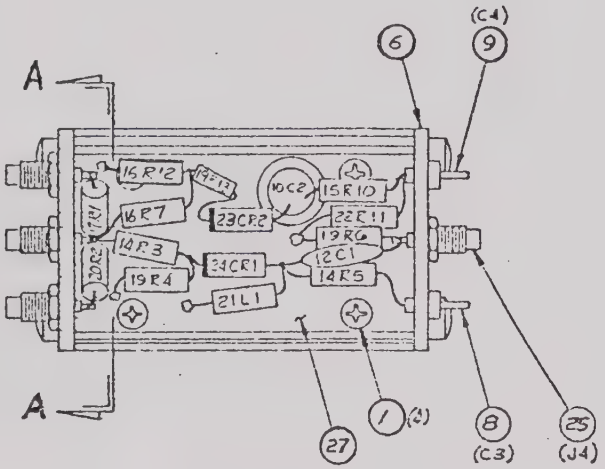
SIZE | DWG NO | REV

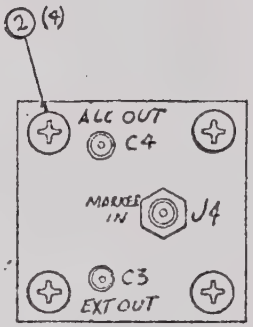


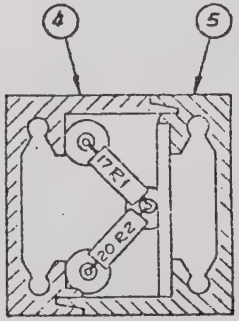
SCHEMATIC - 1-500 MHz AMPLIFIER

A54-0305-01A









VIEW A-A

NOTES:
1. POSITION CR1 AS CLOSE TO PCB AS POSSIBLE.
2. LEAD LENGTHS TO BE AS SHORT AS POSSIBLE.
3. SOLDER 4 CORNERS OF PCB TO END PLATES AND HOUSING (COVER AREA TO BE FREE OF SOLDER).

(-01)

LET	REVISION	DATE
V	ECN C9007 DH	1/5/80
U	REVISED PER ECN 08004	1/4/80
T	Revised Per ECN 9030	4/3/79

TOLERANCES		NAME	DATE
FRACT. ± 1/64	DR	TPR	6/2/77
.XX ±.01	CHK		
.XXX ±.005	ENGR		
ANG. ± 1°	APVD	R J Aaron	6-7-77

Telonic Altair
2525 Laguna Canyon Road • Box 277
Laguna Beach, California 92652
Tel. 714 494-9401 • TWX 910 596-1320

TITLE: ASSEMBLY - MONITOR 1200 SERIES

SH 1 OF 9	SIZE	DWG NO	REV
REL	B	95-0321-01	V

QUANTITY 09	08	07	06	05	04	03	02	01	00	ITEM	PART NUMBER	DESCRIPTION	CKT REF
	4	4	4	4	4	4	4	4		1	02-7202-03	Screw, #2-56 x 1/8	
	8	8	8	8	8	8	8	8		2	02-7204-04	Screw, #4-40 x 1/4	
			1	1						3	14-0662-08	End Plate	
	1	1	1	1	1	1	1	1		4	13-0624-01	Cover	
	1	1	1	1	1	1	1	1		5	13-0624-02	Module Housing	
	1	2		1	1	2	1	2		6	14-0662-06	End Plate	
	1				1		1			7	14-0662-07	End Plate	
	1	1	1	1	1	1	1	1		8	21-0016-01	CFCF 1000pF 500V	C3
	1	1	1	1	1	1	1	1		9	21-0020-01	CFCF 120pF 500V	C4
	1	1	1	1			1	1		10	21-0045-01	CFCM 100pF	C2
	1	1								11	22-0004-01	CFD 470pF	C5
	1	1	1	1			1	1		12	22-0002-05	CFD 47pF	C1
										13			
	2	2	2	2			2	2		14	26-1519-01	RFC 1K 1/4W 5%	R3,5
	1	1	1	1			1	1		15	26-1523-01	RFC 220 1/4W 5%	R10
	2	2	2	2			2	2		16	26-1559-01	RFC 180 1/4W 5%	R7,12
	1	1	1	1			1	1		17	26-8147-05	RFC 470 1/8W 5%	R1
	1						1			18	26-1557-01	RFC 75 1/4W 5%	R2
	3	3	3	3			3	3		19	26-4056-05	RFC 56 1/4W 5%	R4,6,13
		1	1	1				1		20	26-8051-05	RFC 51 1/8W 5%	R2
	1	1	1	1	1	1	1	1		21	32-0029-01	IF 470uH	L1
	1	1	1	1			1	1		22	26-1508-01	RFC 56K 1/4W 5%	R11
	1	1	1	1			1	1		23	41-0015-02	DS 1N82A	CR2
	1	1	1	1			1	1		24	41-0015-04	DS 1S2198	CR1
	3	4	3	3	3	4	3	4		25	44-0078-01	Connector	J1-4
			1	1						26	64-3708-01	Connector	J3
	1	1	1	1	1	1	1	1		27	57-0321-01	PCB	
										28			
										29			
	1				1		1			30	09-4600-01	Eyelet, SE-73	
					1					31	95-0424-01	Cable Assy	
	1						1			32	95-0424-02	Cable Assy	
										33			
			1							34	14-0841-01	End Plate	
										35			
					1	1				36	21-0040-01	CFCM 1000pF	C2
					1	1				37	26-1514-01	RFC 100K 1/4W 5%	R5
					1	1				38	26-1560-01	RFC 270 1/4W 5%	R2
						1				39	26-4047-05	RFC 47 1/4W 5%	R1
					1	1				40	41-0111-01	DS, HP5082-2800	CR1
					1	1				41	22-0002-05	CFD 47pF	C4
					1	1				42	26-1556-01	RFC 51 1/4W 5%	R7
					2	2				43	26-1519-01	RFC 1K 1/4W 5%	R3,8
					1	1				44	26-1523-01	RFC 220 1/4W 5%	R6
					1					45	26-1557-01	RFC 75 1/4W 5%	R1
					1	1				46	26-4056-05	RFC 56 1/4W 5%	R4
					2	2				47	26-1559-01	RFC 180 1/4W 5%	R9,1
					1	1				48	41-0015-04	DS 1S2198	CR2
					1	1				49	26-4010-05	RFC 10 1/4W 5%	R14
										50			
										51			
										52			
										53			
										54			
										55			

NAME

BY

CHK

KB

DATE

7-9-76

TELONIC INDUSTRIES, INC.

21282 Laguna Canyon Road • Box 277
Laguna Beach, California 92652

PARTS LIST

TITLE

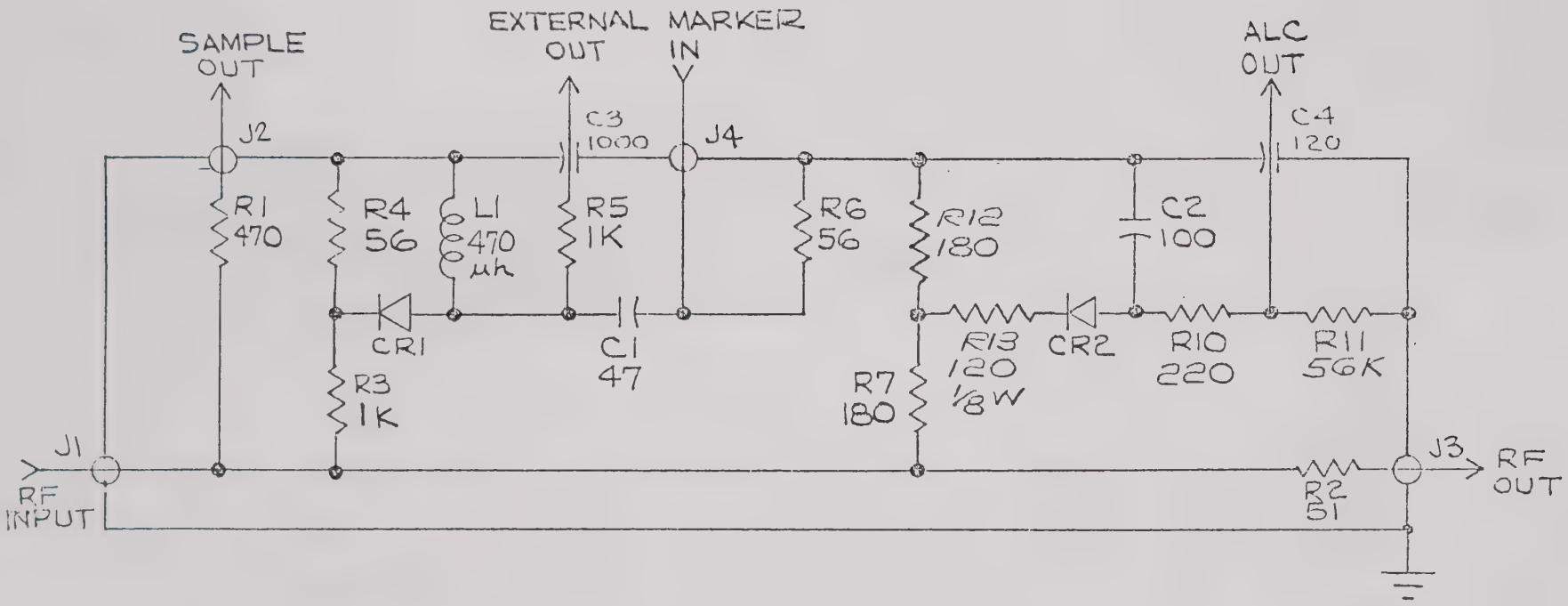
ASSEMBLY, MONITOR MODULE
1200 SERIES

SIZE

DWG NO

REV

SH 9 OF 9

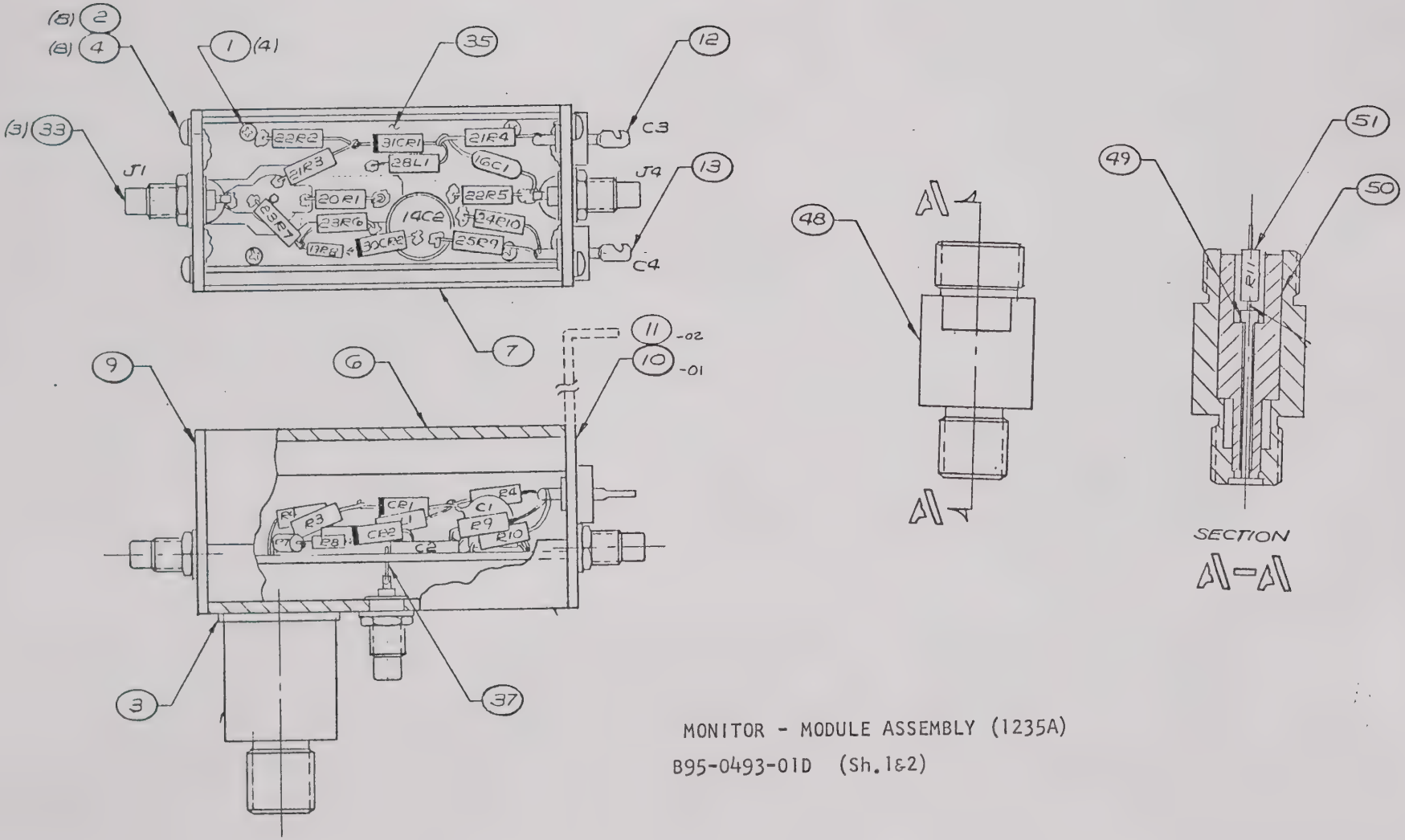


NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES IN OHMS ±5%, ¼ WATT.
2. CAPACITOR VALUES IN PICOFARADS
3. DIODES TYPE IN82A (CR2)
   152198 (CR1)

SCHEMATIC - MONITOR (1205A)

A54-0321-01G



MONITOR - MODULE ASSEMBLY (1235A)

B95-0493-01D (Sh.1&2)

QUANTITY 09	08	07	06	05	04	03	02	01	00	ITEM	PART NUMBER	DESCRIPTION	CKT. REF.
							4	4		1	02-7202-02	Screw #2-56 X 1/8 lg	FILL.
							8	8		2	02-7204-04	Screw #4-40 X 1/4 lg	FILL.
							1	1		3	03-1021-01	Washer Flat 1/2 I.D	
							8	8		4	03-1033-01	Lockwasher Spring #4	
										5			
							1	1		6	13-0643-01	Cover	
							1	1		7	13-0643-02	Module Housing	
										8			
							1	1		9	14-0662-05	End Plate	
								1		10	14-0662-06	End Plate	
							1			11	14-0841-01	End Plate	
							1	1		12	21-0016-01	CFCF 1000pF	C3
							1	1		13	21-0020-01	CFCF 120pF	C4
							1	1		14	21-0045-01	CFC 100pF	C2
										15			
							1	1		16	22-0002-05	CFD 47pF	C1
										17			
										18			
							1	1		19	26-3024-01	RFC 120Ω 1/8W 10%	R8
							1	1		20	26-1561-01	RFC 470 1/4W 5%	R1
							2	2		21	26-1519-01	RFC 1K 1/4W 5%	R3,4
							2	2		22	26-4056-05	RFC 56 1/4W 5%	R2,5
							2	2		23	26-1559-01	RFC 180 1/4W 5%	R6,7
							1	1		24	26-1508-01	RFC 56K 1/4W 5%	R10
							1	1		25	26-1523-01	RFC 220Ω 1/4W 5%	R9
										26			
										27			
							1	1		28	32-0029-01	IF 470μH	L1
										29			
							1	1		30	41-0015-02	DS IN82A	CR2
							1	1		31	41-0015-04	DS 1S2198	CR1
										32			
							3	3		33	44-0078-01	Connector	J1,2
										34			
							1	1		35	57-0493-01	PCB	
										36			
							AR	AR		37	43-0043-01	#22 Buss Wire	
										38			
										39			
										40			
										41			
										42			
										43			
										44			
										45			
										46			
										47			
							1	1		48	09-0556-01	Housing Connector	J3
							1	1		49	09-0558-01	Contactor	
							1	1		50	09-0557-01	Insulator Connector	
							1	1		51	26-1557-01	RFC 75 1/4W 5%	R11
										52			
										53			
										54			6-35

NAME TPR

DATE 7/29/77

PARTS LIST

TELONIC INDUSTRIES, INC.

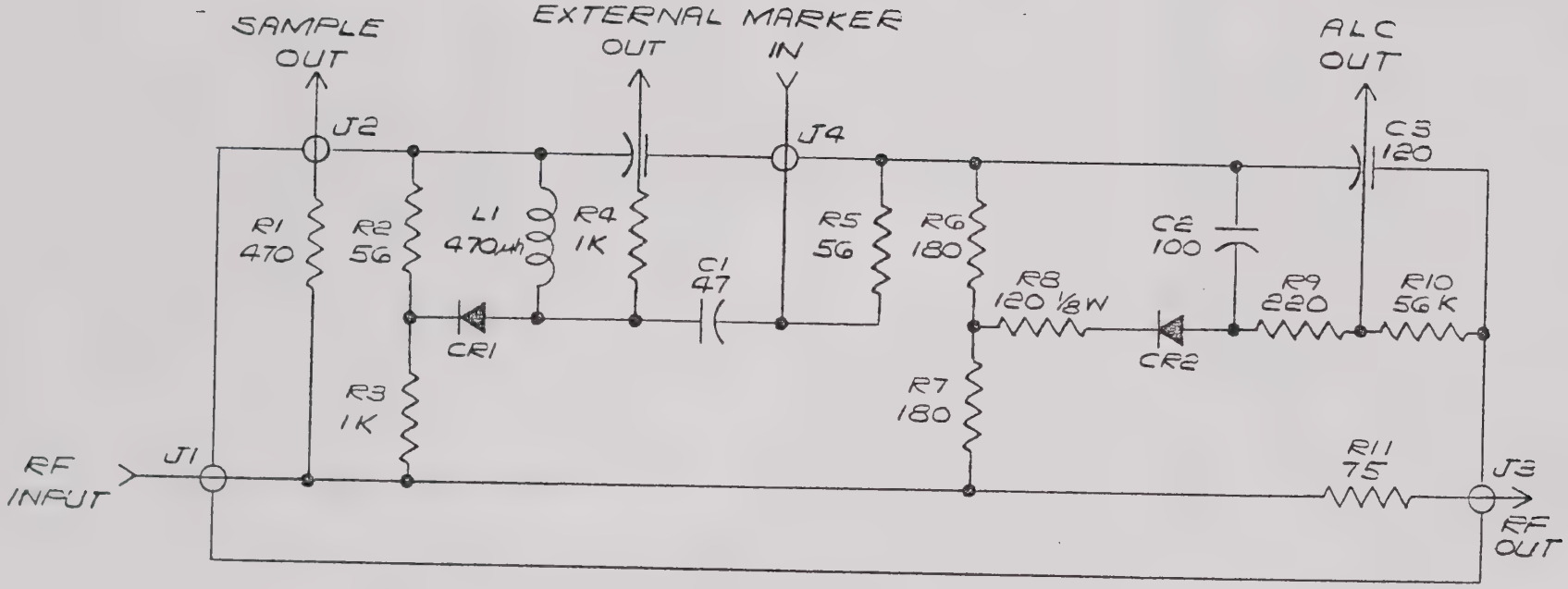
TITLE ASSY, MONITOR MODULE

SH 3 OF 3

SIZE

DWG NO

REV

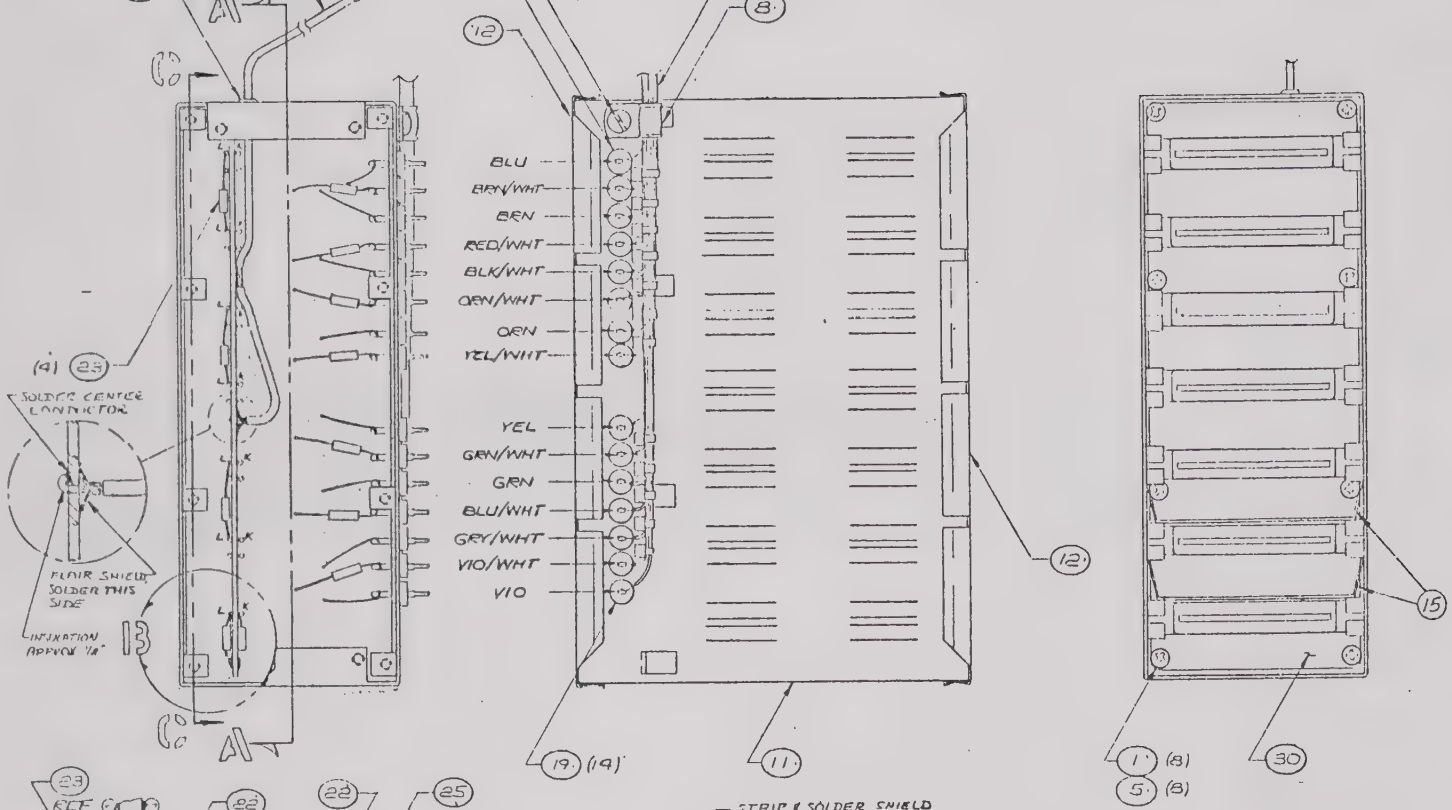


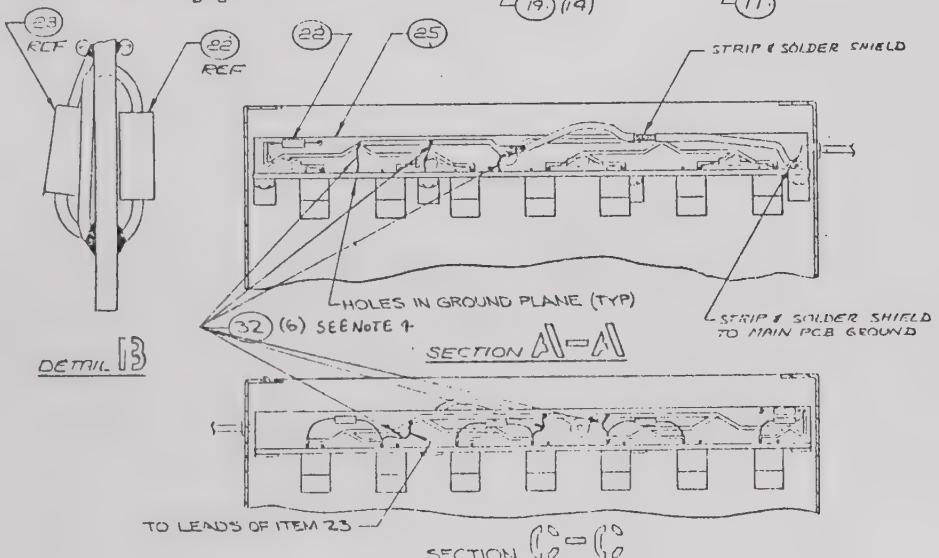
NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES IN OHMS ±5%, 1/4 WATT
2. CAPACITOR VALUES IN PICOFARADS
3. DIODES TYPE IN82A (CR2)
   IS2198 (CR1)

SCHEMATIC - MONITOR (1235A)

A54-0493-01





FIXED MARKER BOX ASSEMBLY

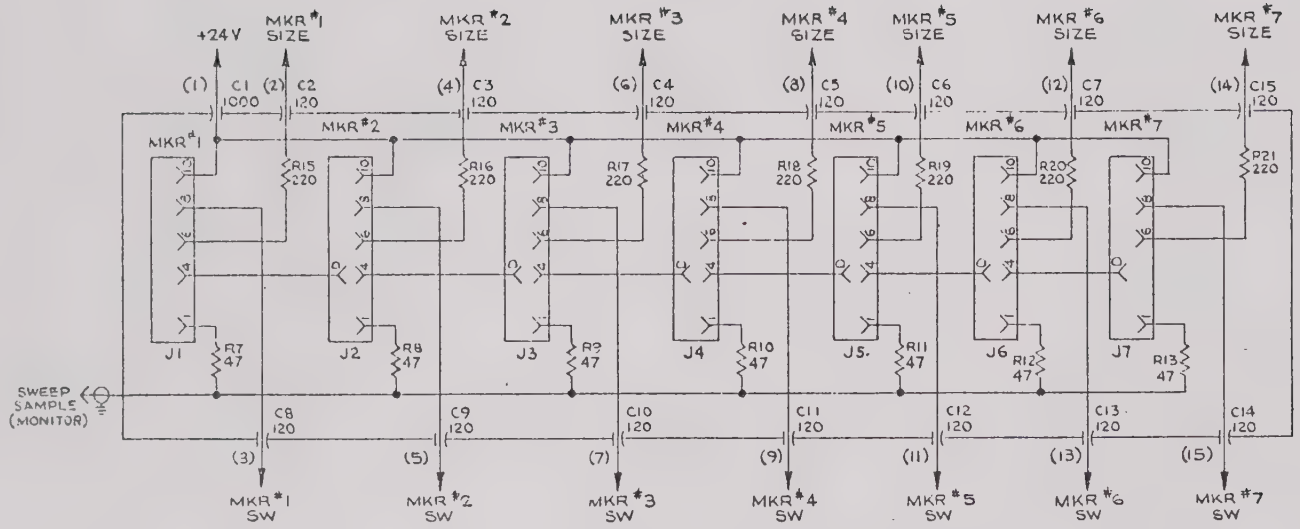
C95-0519-01G

MODEL 1205A/1235A

Electrical Parts List

Fixed Marker (Assembly No. 95-0519-01)

Circuit Ref	Description	Telonic Part No.
C1	CFCF, 1000pF	21-0016-01
C2	CFCF, 120pF	21-0020-01
C3	Same as C2	
C4	Same as C2	
C5	Same as C2	
C6	Same as C2	
C7	Same as C2	
C8	Same as C2	
C9	Same as C2	
C10	Same as C2	
C11	Same as C2	
C12	Same as C2	
C13	Same as C2	
C14	Same as C2	
C15	Same as C2	
J1	Connector P.C.B.	44-0102-01
J2	Same as J1	
J3	Same as J1	
J4	Same as J1	
J5	Same as J1	
J6	Same as J1	
J7	Same as J1	
R7	RFC, 47Ω, 1/8W, 10%	26-3003-01
R8	Same as R7	
R9	Same as R7	
R10	Same as R7	
R11	Same as R7	
R12	Same as R7	
R13	Same as R7	
R14	Not assigned	
R15	RFC, 220Ω, 1/4W, 10%	26-1501-01
R16	Same as R15	
R17	Same as R15	
R18	Same as R15	
R19	Same as R15	
R20	Same as R15	
R21	Same as R15	



SCHEMATIC - MARKER

C55-8573-01

APPLICATION NOTE

3 WATTS OF SWEEP POWER - 2 TO 500 MHz

USE OF TELONIC ALTAIR 1200 SERIES UNITS WITH EXTERNAL AMPLIFIERS

General

This application note describes the theory and techniques of utilizing any of the Telonic 1200 series sweep generators with an external power amplifier. The application centers about the Electronic Navigation Industries Model 503L Amplifier with 3 watts output and 40dB of linear gain; however, any similar amplifier will function in the same manner. At present the upper frequency is limited by the state-of-the-art to nominally 500 MHz at the 3 watt power level - additional information will be made available as the frequency range and power level expands.

Configurations

A. Direct Connection (Figure 1)

(1) 50Ω

The simplest connection between the generator and the amplifier is the direct connection as shown in Figure 1. With this connection, input to the device under test is only as flat as the response of the amplifier. Care should be taken to keep cabling between the generator and amplifier as short as possible in order to maximize the flatness of the signal input to the amplifier.

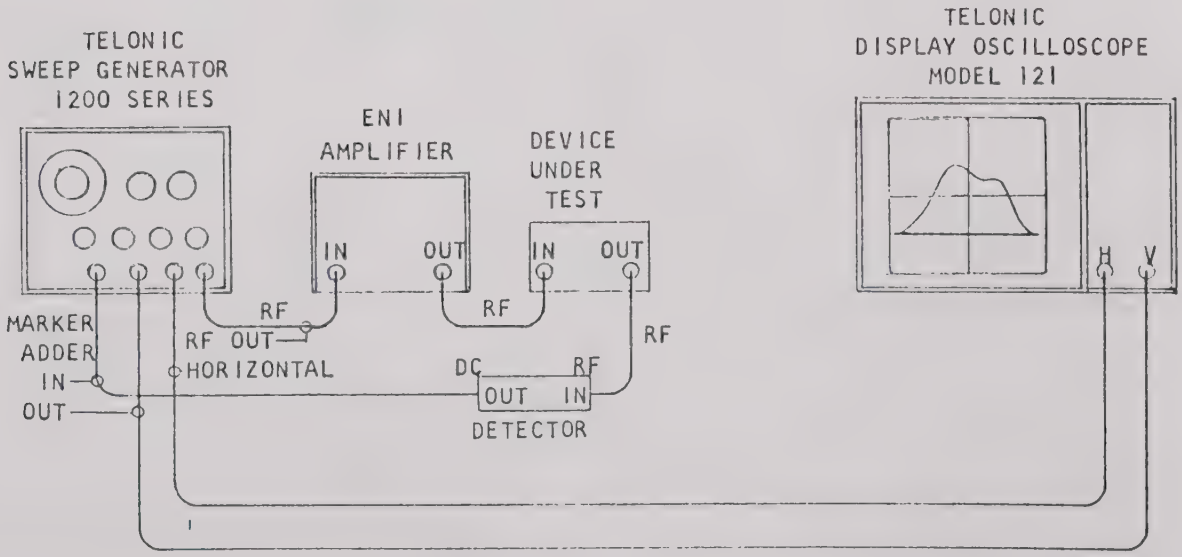


Figure 1 - Direct Connection Setup

With the direct connection, the output impedance of the system will be that of the amplifier (50Ω in the case of the ENI 503L). To obtain the rated 3 watts, insert the following levels of attenuation (front panel control on sweep generator) and adjust to full power with the RF LEVEL control of the generator (see Table 1).

Table 1

Model	Attenuation to be Inserted
1205A/1210	5dB
1204A	8dB
1201A/1202A	11dB

(2) 75Ω

To use the amplifiers with 75Ω units (1235A, 1240, 1234A, 1231A) insert a matching pad (Telonic TML 50/75) between the generator and the amplifier and reduce the attenuator level stated above by 5dB.

B. Externally Levelled Configuration

(1) Levelling Description

Telonic Altair 1200 series sweep generators are provided with the capability for externally levelling the output at some remote point. To fully understand tnis feature, the process of levelling (as done internally in the sweep generator) is shown in the diagram (Figure 2).

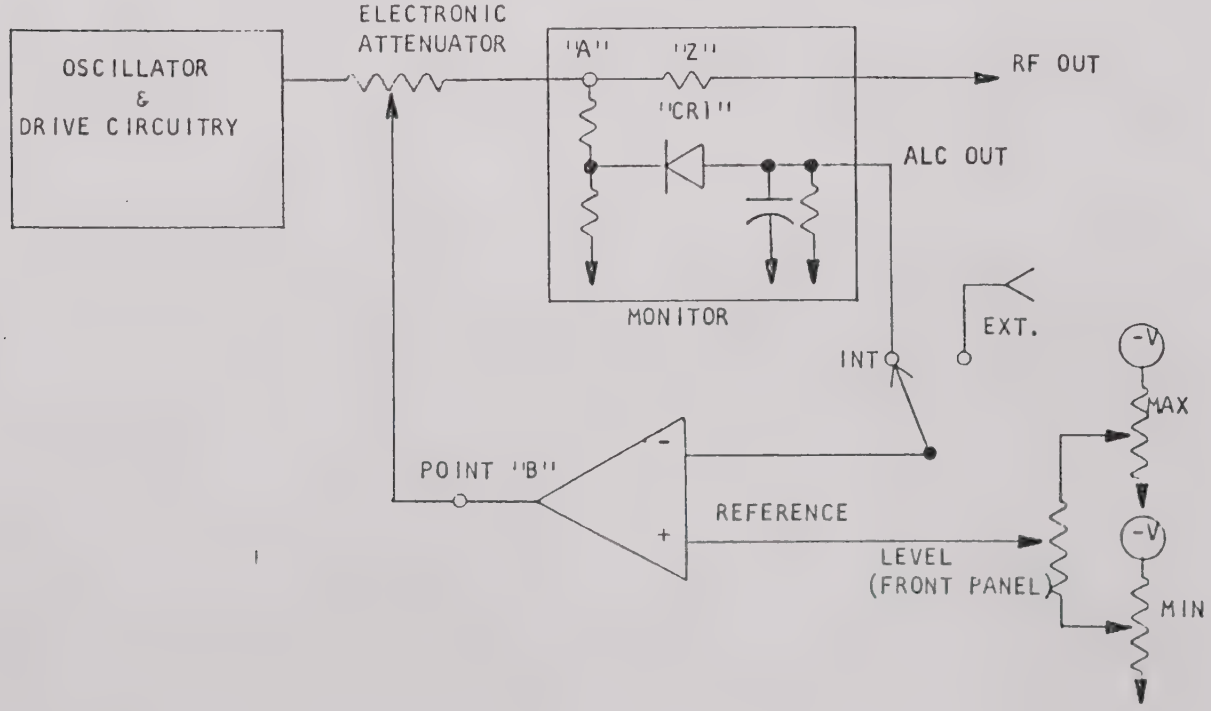


Figure 2 - Levelling Action (Inside Telonic Sweep Generator)

The detector diode (CR1) produces a DC output (ALC out) proportional to the RF amplitude at point "A". This detected output is compared against a reference provided by the LEVEL control of the front panel. Internal adjustments govern the maximum and minimum reference voltages to the comparing amplifier. The output of the amplifier (point "B") is used to drive an electronic attenuator (P-I-N diode or AGC device) with the effect being to hold the RF amplitude at point "A" constant. The impedance of the generator (assuming '0' dB of attenuation is inserted) is governed by the value of the resistor "Z" since the levelling action produces a dynamic zero ohm impedance level at point "A". External levelling is achieved in the same manner except that the internal detector is NOT used and detected signal is provided by an external monitor (schematically shown in Figure 3).

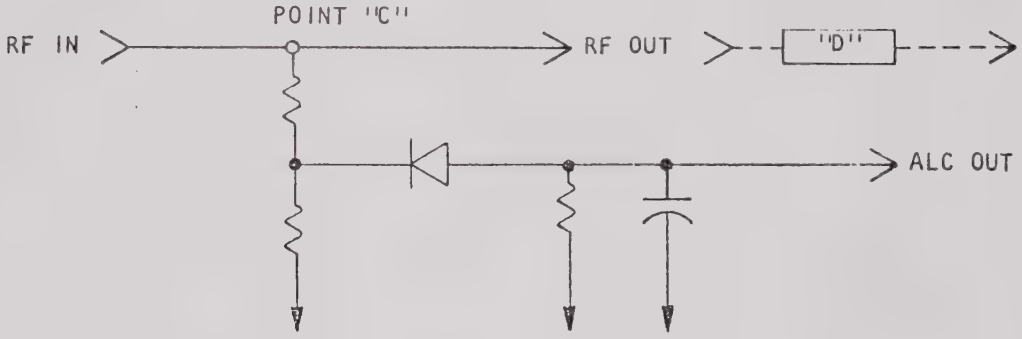


Figure 3 - External Monitor Telonic Model 8500

When the external monitor is used, the RF at point "C" is held at a constant amplitude; hence, the impedance at the RF output is effectively zero ohms. This may be changed by the addition of an impedance determining resistor or by adding an attenuator (D) to the output. Note that only 7 dB of attenuation at point "D" is required to achieve 1.5/1 VSWR.

(2) Configuration for External Levelling

Figure 4 is a diagram of the suggested setup using the ENI 503L. Telonic Altair Model 8500 external monitor is designed to provide correct levelling voltages for 3 watts output. For other power levels, it may be necessary to readjust the max. and min. RF level controls internal to the sweep generator to obtain the correct reference. The Telonic Altair Model 8143 benchmount (50Ω) and 8145 (75Ω) attenuator is capable of handling the 3 watt power level.

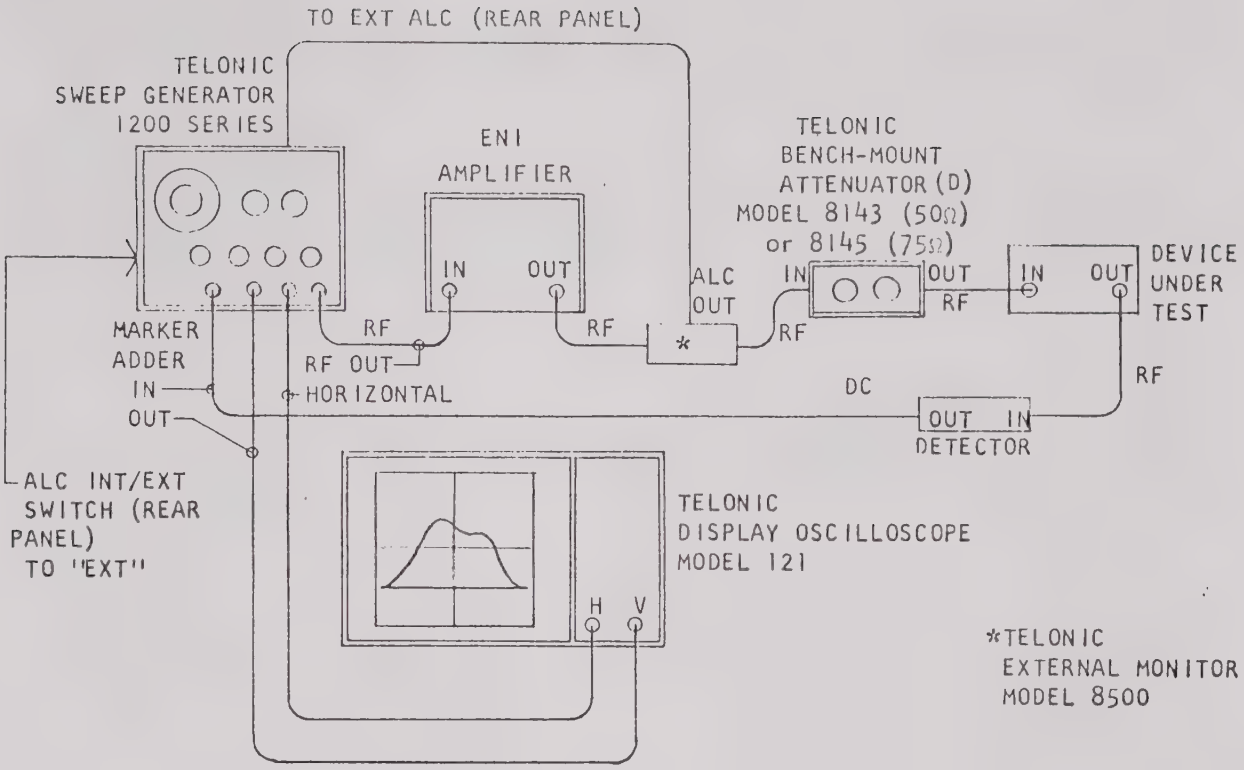


Figure 4 - Externally Levelled Setup

Set the RF attenuator on the sweep generator to levels shown in Table 1. For 75 ohm units, set levels 1dB less than those shown in Table 1. A matching pad is not required between the sweeper and amplifier. Adjust the RF LEVEL control of the sweep generator for the desired output.

Note: Before connecting detector, ensure that the output of the device will not exceed the maximum input specified for the detector used.

Although this application note refers to the Telonic 1200 series specifically, the same type of levelling circuitry is used on other generators such as the 1006B, 1011B, and 1030 and external levelling can be provided. Please state, however, that external levelling is required when ordering.

For further information, contact:
Telonic Altair Inc.
2825 Laguna Canyon Rd.
Laguna Beach, CA 92652

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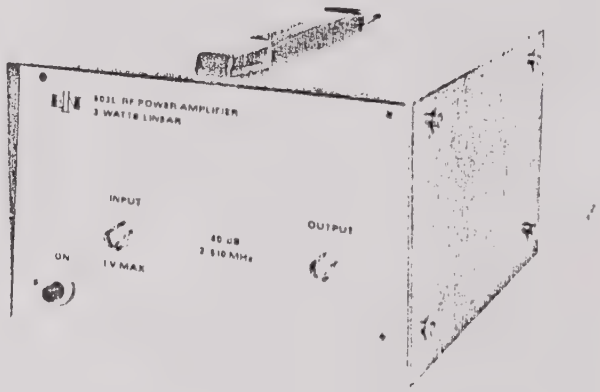
503L BROADBAND POWER AMPLIFIER

- *All solid state*
- *1.6MHz to 540MHz coverage*
- *3 watts linear output*
- *40dB gain*
- *No tuning*
- *Works into any load*
- *Microelectronic construction*
- *Low cost*



DESCRIPTION

The Model 503L is a general purpose broadband amplifier capable of more than 3 watts of linear power output when driven by any laboratory signal or sweep generator from 2 to 510 MHz.

An ultra linear Class A design, the 503L will "boost" the output of any signal source by a flat 40dB (±1.5dB) and provide its full foward output power into any load impedance (from an open to a short circuit). Its output is a faithful reproduction of the input waveform for AM, FM, SSB, CATV, pulse and other complex modulations. Although specified only over the 2 to 510 MHz frequency range, full power output is typically available from 1.6 to 540 MHz.

The use of microwave transistors on thin film substrates, microstrip circuitry, and plug-in modules make the 503L both reliable and easy to service. An integral power supply and cooling system permit operation over a wide range of temperature and AC line conditions.

The Model 503L will extend the power output capability of signal generators, sweep generators, frequency synthesizers and other signal sources. The availability of increased power, without the complexity of tuning, increases the utility of these units.

As a drive source in Antenna, Laser, NMR, and Ultrasonic applications, the unit will provide essentially constant forward power, regardless of the transducer load impedance.

The low noise figure and high output of the Model 503L makes it ideal for the amplification and distribution of television and other signals over long cables or through multicoupler networks.

Used as a video amplifier, the Model 503L will reproduce pulse waveforms with risetimes as short as 1 nanosecond.

- Signal generator amplification
- TV distribution
- ECM Systems
- General laboratory use
- Wideband video
- Ultrasonics
- Electro-Optical
- S-Parameter measurements
- RFI/EMI testing

SPECIFICATIONS

Frequency Coverage:	2 to 510 MHz
Gain:	40dB nominal
Gain Variation:	± 1.5dB
Maximum Linear Power Output	More than 3 watts
Harmonic Distortion:	All harmonics greater than 25dB below the fundamental at 2.5 watts output. Lower Distortion at reduced power.
Input/Output Impedance:	50 ohms
Input VSWR:	1.5 Maximum
Output VSWR:	2.5 Maximum
Stability:	Unconditionally stable
Typical 3rd Order Intermodulation Intercept Point:	+44 dBM
Noise Figure:	10 dB
Power Requirements:	115/230 VAC ±10%, 50-400Hz,at 90 watts
Size and Weight:	5¼ x 8 x 10 inches; 11 lbs.
Operating Temperature:	0° to 45° C
Output Connectors:	BNC standard, SMA and type N optional
Rack Mounting:	Adaptors provided

For further detailed information or specific customer design requirements, please contact ENI or our local sales representative.

ELECTRONIC NAVIGATION INDUSTRIES INCORPORATED
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APPLICATION NOTE

MINIMIZING VSWR RIPPLE DUE TO LOAD MISMATCH

This Application Note describes a means of minimizing the undesirable effects of load mismatch as occurs when a sweep generator is connected to the load through an electrically long piece of cable. In Figure 1, a typical sweep generator configuration is shown.

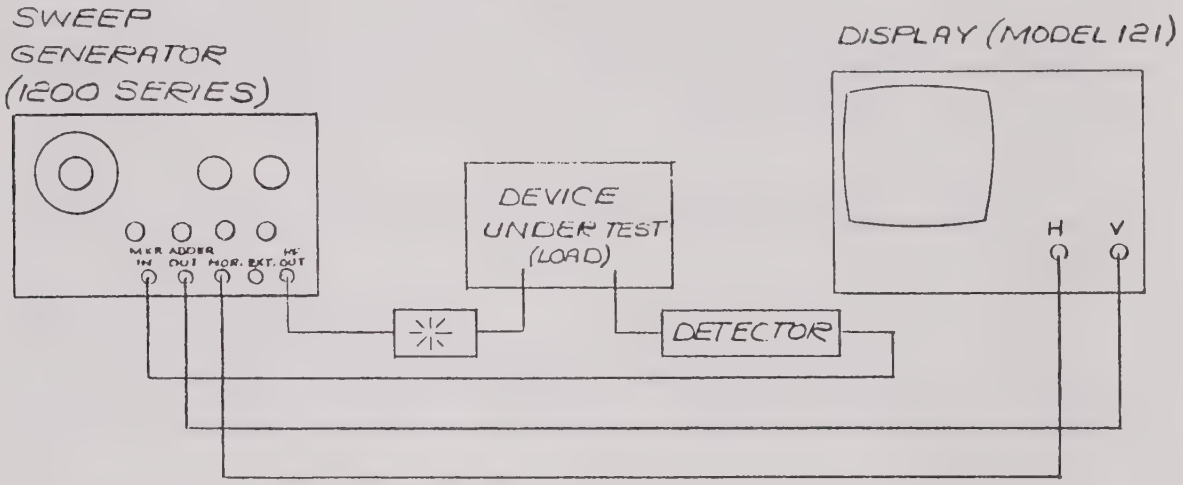

Figure 1 Typical Sweep Generator

*Fixed Pad Attenuator (see text).

If the load is not matched to the line, the impedance seen by the generator will be a function of frequency. This means that the power delivered to the load will also be a function of frequency, and the resulting frequency response will be non-flat. This unflatness will be characterized by ripples in the swept response - the longer the cable, the more ripples.

In order to minimize the effects of load mismatch, the use of a fixed pad attenuator such as Telonic Model 8201 is recommended. The appropriate value of attenuation depends on:

a) The degree of VSWR of the load, and
b) How much loss of power can be tolerated at the load.

Figure 2 is a nomogram showing the effect of VSWR reduction due to installing a fixed degree of attenuation between the load and the line. For example, 6dB of attenuation in the line, with a load VSWR of 3/1, will reduce the VSWR as seen by the generator to a mere 1.28/1. This means that the voltage delivered to the load will be much flatter with frequency due to the effects of the fixed pad attenuator. It is further suggested that the fixed pad be placed as physically close to the load as practical.

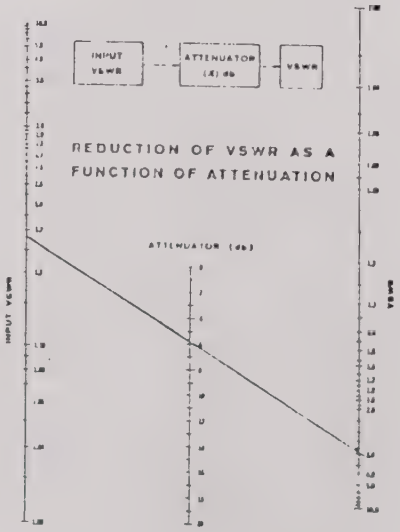

Figure 2

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC/BERKELEY are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

CUSTOMER RETURN OF EQUIPMENT (REPAIR, REPLACEMENT, DUPLICATION, CREDIT, OTHER)

All customer returns require authorization from TELONIC/BERKELEY prior to shipment of equipment. Any equipment returned without authorization for shipment will be at the customer's or distributor's expense.

Instructions for Returning Equipment to Telonic:

1. Contact factory with details of part number, serial number, original purchase order number and reason for return.

2. Telonic will issue instructions on returning the material to the factory or to our regional repair facility. "Please do not return instruments or parts before receiving directions." This will assure you the fastest possible service on Telonic products.

3. Customer is expected to ship all returns prepaid freight. Material will be returned via same shipping method as received unless otherwise instructed.

   Units will be shipped "Prepaid"....In Warranty and
   "Collect"....Out of Warranty.

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